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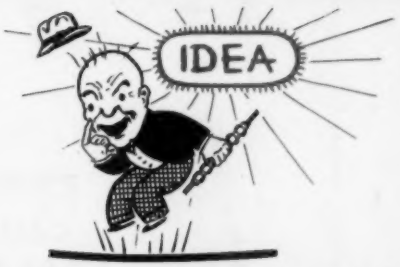

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In the Nation's Capital

by Francis X. Welch

Special Washington, D. C., Correspondent for TELEPHONY

***SOME TROUBLESOME POINTS** dealing with the neutrality act will have to be discussed by Congress in its special session. . . . New bill for reorganization of administrative agencies may be introduced in Congress during this session. . . . Amendments to wage-hour and labor relations acts due for presentation at the regular session in January*

THE HOPE of the administration for a short and snappy special session is already slipping. Even the most optimistic observers think that it will take Congress at least the entire month of October to get through with the neutrality issue. The more cautious forecasters say it may take until pretty near Thanksgiving (whenever that is).

There are not many in Washington who think that the isolationists have much chance to beat the President's fight for repeal of the arms embargo. But the entire neutrality issue is not so simple as a determination of that particular point. There are a number of complications incident to a revision of the country's neutrality policy which will have to be settled, and there are a number of Senators and Representatives with speeches bubbling up inside of them who will have to be given an outlet or they will explode.

Even the routine of getting the special session down to brass tacks has not been planned as smoothly as other sessions under the New Deal. The President was in such a hurry to get Congress here that he gave it only ten days' notice—the shortest in the history of the country. After Congress got here and listened to his opening address, it had to recess until the following week because there was nothing definite for the members to tackle on the floors of the houses.

The American shipping industry, for example, will want to know what its rights are, assuming passage of the cash-and-carry provisions and restrictions against American ships in belligerent ports.

Will they be permitted to continue traffic to a technically neutral port, such as the Irish port of Cobh, thereby practically circumventing the purpose of the belligerent port restriction? Or is the American merchant marine, under a strict interpretation of "danger zones" to be wiped off the Atlantic Ocean to make room for somebody else's war? In the latter event, business concerns having a normal legitimate commerce with neutral countries in Europe are bound to kick up a fuss.

These are just a few of the troublesome points that Congress will have to go over step by step and a bitter fight is likely to break out at each step of the way.

If, therefore, Congress is in session until November, there will be a strong temptation to continue in business, with just a liberal recess over the holiday season, until the regular session which is due to resume next January. In this event, there will also be a strong temptation for Congress to take up other matters, once the neutrality issues have been disposed of, or during the intervals when one or the other houses of Congress might be marking time.

The truth of the matter seems to be that there are a number of members in Congress on both sides of the party aisle who are not very keen about leaving Washington again under the full and undisputed sway of the President. They would just as soon stick around and check his actions—which is exactly what the administration doesn't want.

ALL OF THIS brings up for attention the current rumor that the administration may try once more for a reorganization bill in which the FCC may be included. Just how much truth there is to this rumor is a ticklish matter to decide. The urge to take another shot at administrative reorganization is primarily a hangover from the old 1938 battle which finally resulted in the administration getting only a few crumbs of comfort. Even what has been done so far under the emasculated reorganization act has not pleased everyone by any means.

The Interior Department, for example, is fretting over the loss of the independent status of the Rural Electrification Administration which was blanketed under the wing of the Agriculture Department. The REA was Secretary Ickes' pet, even while it was an independent agency, and the Interior Department is said to feel that if REA has to be subordinate to any Cabinet officer it ought to come back home to the Interior Department.

The protective coloring for a new administration drive for reorganization of administrative agencies would be the nice new handy alibi of "national defense." In fact, about every important new move that will be made here in Washington for the next year or so is going to be labeled either "national defense" or "protection of American neutrality."

The idea that the FCC might be fitted into some new general reorganization plan arises naturally from the FCC's troubled situation in the past and in view of the fact that the administration is already on record as favoring an overhauling of the FCC, as exemplified in the McNinch-Wheeler bill, vainly introduced in the last session.

For that matter, it may be recalled that the original general administrative reorganization plan, advocated by the President's special committee but dropped during the early conferences on the original New Deal reorganization bill, would have blanketed all of the independent federal commissions under various Cabinet departments. Here is a passage taken from the 1937 report of the President's special committee, functioning under the chairmanship of Louis Brownlow:

> The main features of the suggested solution of the independent commission problem will be set forth briefly before examining in detail the major problems involved in putting it into operation. The plan would put independent commissions into regular executive departments if "suitable" departments now exist or can be provided.
>
> "Suitable" departments are those that have functions relevant to those of the commission, and that are neutral with respect to the regulatory duties of the commission rather than "promotional" or otherwise biased. If suitable departments cannot be provided, commissions should be independent.

The ostensible objectives urged by the Brownlow committee for such reorganization were efficiency and economy, through the elimination or coordination of overlapping governmental functions now conducted by various boards and bureaus. If another attempt is made in this direction, we shall probably hear that it is necessary to streamline the federal government so as to get rid of surplusage, deadwood, and strip the decks for action "in case of emergency."

Already a half-dozen bootleg versions of so-called "outline charts" with skeleton set-ups for an "ideal" federal government organization are being privately shown around Washington by subordinate officials who profess to have "inside dope" on which way the administration cat is going to jump.

THE TROUBLE with these different versions is that they are so conflicting that they neutralize, on their very faces, the idea that there is any authentic administrative drive behind the respective proposals. This is probably due to the fact that each Cabinet department has its own idea of what should be allotted to it by way of reorganization.

It is well to know that certain officials of the Commerce Department have long nourished secret desires to kidnap the FCC; but right here the Post Office Department would certainly be heard from if the Commerce Department ever made an overt move in such a direction.

And so it goes with other agencies and bureaus which have been created from time to time without any particular Cabinet department affiliation. It is plausible enough to talk about the economy and efficiency of a general reorganization plan in the abstract. When it comes right down to cases, however, any such plan runs headlong into the inevitable chaos of interdepartmental jealousies.

Finally, there is Congress to be considered, with its sensitive network of patronage spreading into each department and bureau, whether dependent or independent. Any attempt to hack off a useless limb of the government or to shrink it to subservient proportions invariably results in an outcry from Capitol Hill, where the pain is felt immediately.

Under these circumstances, the administration may not care to start another fight in Congress over administrative reorganization, notwithstanding the attractive temptation to put it through this time under patriotic coloring. It is simply that rumors that it may be done are once more flying in the Washington atmosphere. Your correspondent reports them for what they are worth with the further observation that nothing of the sort will be attempted unless the administration's victory on the neutrality issues reveals far more Congressional support and respect for the New Deal than was apparent at the last session.

OTHER THINGS which will come up either at the tail end of the special session or early in the next session are not likely to affect utilities or the telephone business very directly. There will, of course, be the long-overdue general tax revision, upon which the Treasury Department has been working all summer. This will probably mean higher taxes for businesses which are still making money, but special levies on utilities will not be suggested.

For the past three years, there has been a growing disposition on the part of the federal government to recognize special taxes on utilities as being more within the province of state tax authorities than for the federal government. About the only difference the war situation may make in the new tax bill will be the chance inclusion of some new form of excess profits tax to discourage profiteering.

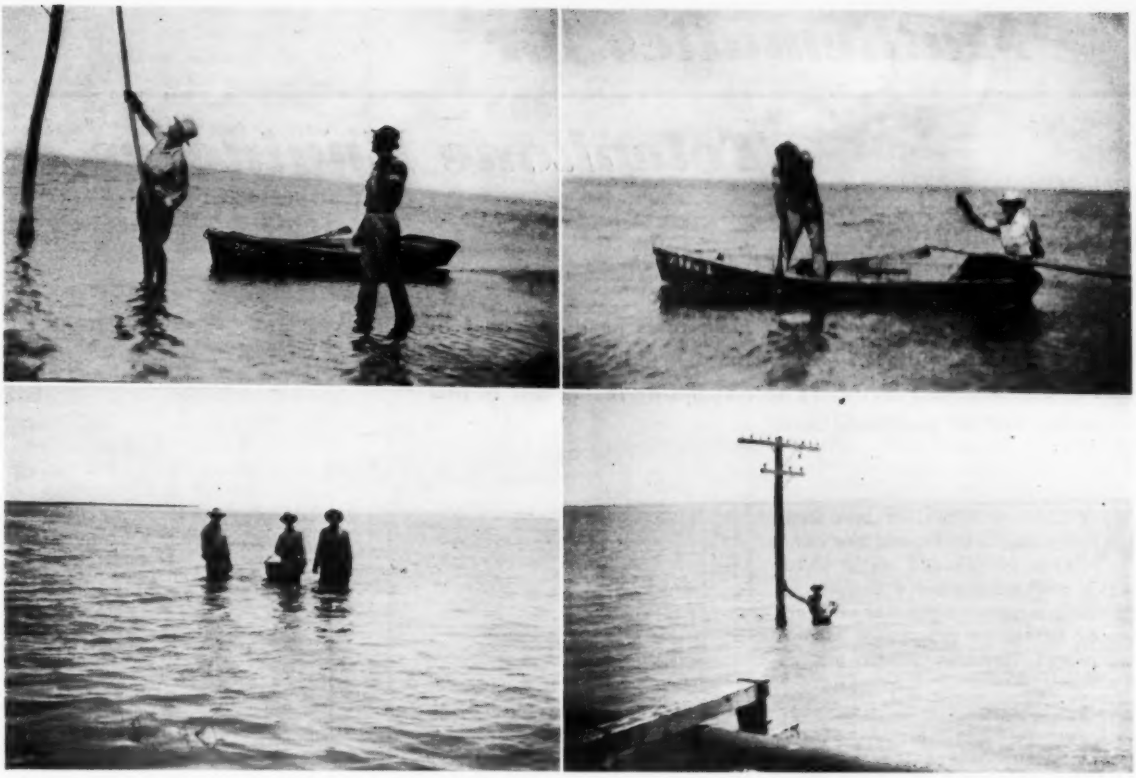
Speaking of profiteering, however, recalls that there are several bills still in Congress, such as the "May bill," which would give the federal government price control over certain essential commodities. The real purpose of such legislation is to stabilize the nation's economic system in the event the country becomes actively engaged in war.

Under the stimulation of the European disturbance, however, these bills are likely to be trotted out at least for committee inspection. It is not believed that they stand much chance of passage as long as the United States remains neutral. However, some particular commodities may be threatened with federal price control regulation—such as coal, oil, steel, copper, and other essential minerals—if these commodities start climbing out of sight. Whatever may be done along this line could hardly harm the telephone industries, and may actually turn out to be beneficial to some degree.

THE WAGE-HOUR Law and the National Labor Relations law are already due for disturbing activity at the regular session of Congress. Representative Smith of Virginia, chairman of the House committee to investigate the NLRB, has had his investigation plan somewhat disorganized by the international situation. But his committee is likely to make its report in time to get some sort of a bill to amend the National Labor Relations Act before the regular session. It is too early, of course, to have even the faintest idea as to what might be in such a bill.

However, if utility strikes—such as the electric power strike which was threatening in Michigan as these lines were written—should become a source of public annoyance and serious inconvenience within the next few months, the Smith committee may take cognizance of the situation to the extent of giving utility labor a little special attention. Needless to say, utility strikes are not going to be very popular from now on.

Ordinarily, the war situation would have taken a little of the edge



This group of telephone men might almost be in the "Believe It or Not" class, according to Sam H. Shutt, Sherman, Texas, general manager of the Texas Telephone Co. The "snaps" were taken while members of a company construction crew were stringing toll lines. The men proved their versatility in water as well as on land in stringing a copper circuit from Arkansas Pass to Port Arkansas on the gulf coast of Texas. As the snapshots were taken in hot weather perhaps the men enjoyed working in the water for a change.

off the plan of the agricultural bloc to seek further amendment of the Wage-Hour Law, but your correspondent learned last week that the leaders of the agricultural bloc are just as determined as ever to press the fight—even during the special session if they get a chance.

They are stung by recent reports that the inner circle of the New Deal is dissatisfied with Wage-Hour Administrator Andrews' easy-going attitude, and is planning to replace him with a "hard-boiled" administrator, in the person of Lieutenant Colonel Phillip Fleming, who has been doing a number of trouble-shooting chores to the satisfaction of the administration.

Then, too, it must be recalled that there is an automatic boost in the wage and hour standards under the 1938 act, effective in 1940. Such standards are bound to result in a fresh chorus of outcries from the business sector. All in all, it looks as if another battle to amend the Wage-Hour Act, at least at the regular session, is inevitable.

Other than what has already been mentioned, there isn't really much important work for Congress to do, outside of standing guard over the nation's neutrality policy and keeping it continuously in check. There will be routine appropriation squabbles and presidential politics, which have been eclipsed these many weeks by foreign hostilities, to blossom once more, even if they do not attract as much attention as of yore.

Relatively speaking, the regular session ought to be a pretty quiet one unless, as suggested in the beginning of this article, the New Deal makes another try for a general reorganization bill. In that case, it will have a real battle on its hands.

▼ ▼

Questions on Application of Wage-Hour Law

Anticipating that the greatest interest in the wage and hour question is now in the application of the federal law containing the recent amendment exempting operators in exchanges which have less than 500 stations, the wage and hour committee of the United States Independent Telephone Association is making provision for answering questions at the organization's convention in Chicago next month.

The wage and hour committee has been assigned a definite place on the convention program. It will be of great assistance to the committee if those having questions regarding the law will submit them in advance so the committee will have some opportunity to give them consideration. It is requested that any such questions be mailed to Louis Pitcher, executive vice-president, United States Independent Telephone Association, 616 S. Michigan Ave., Chicago, or to the committee's chairman, J. H. Agee, Lincoln Telephone & Telegraph Co., Lincoln, Neb.

▼ ▼

MR. and MRS. J. G. CRANE, Kansas City, Mo., have the sympathy of their many friends in the telephone field in the death of their daughter, Margaret, who passed away in Chicago, September 2, after a short illness. Mr. Crane is vice-president of Theodore Gary & Company, chairman of the board of directors of Automatic Electric Company and vice-president of Associated Telephone & Telegraph Co.

Mathematics for Telephone Engineers

By H. H. HARRISON

A DESCRIPTIVE analysis of harmonics as determined by fundamental vibration is given in Article Nine, Section I, of this mathematics series. The concluding instalment in this series will be published soon

WHEN A NOTE is produced, by, say, a violin and the same note is sounded on a flute, there is a characteristic difference in tone which is due to a number of overtones or harmonics superposed on the fundamental vibration which pitches the note.

The fundamental vibration together with these overtones represents simple harmonic excursions of the vibrating means; and these are given by a family of sine or cosine curves or both which, added together, produce the characteristic sounds of the instrument. The shape of the complex wave can be drawn if the phases and amplitudes of the constituent vibrations are known.

Fig. 223(a) represents a sine wave

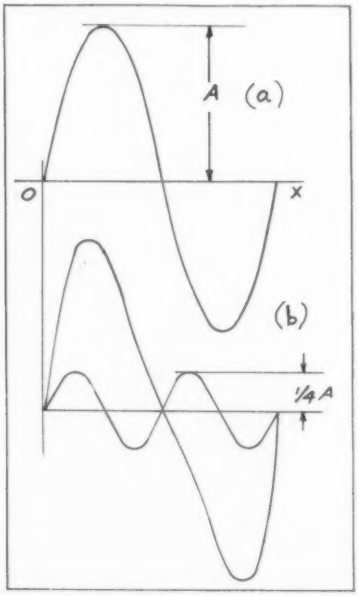


Fig. 223. Fundamental sine curve (a) and fundamental plus a double frequency harmonic.

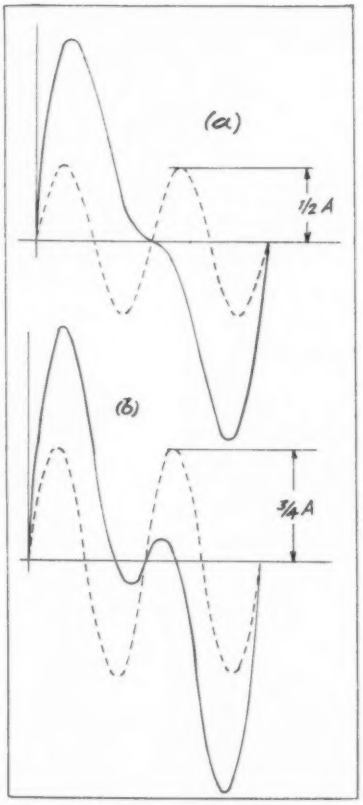


Fig. 224. Influence of different harmonics on fundamental.

which may be regarded as the fundamental or reference vibration. It has a maximum value or *amplitude*, A, and is repeated with a frequency, $f=w/2\pi$, where w is the angular velocity in radians per second of the rotating vector generating the curve. If to this is added the harmonic of frequency, 2f, and amplitude, ¼ A, in phase with the fundamental, the curve Fig. 223(b) is produced. The effect of increasing the amplitude of the harmonic to ½ A and ¾ A, respectively, is shown in Fig. 224.

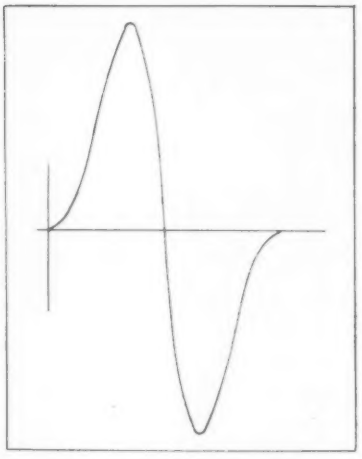


Fig. 225. Influence of phase of harmonic on fundamental.

Fig. 225 shows the effect of phase shift. The curve is the resultant of curves having the amplitudes A and A/2 but the phase of the latter is reversed as compared with that of Fig. 224(a).

Fig. 226 (a) shows the effect of a third harmonic. This is in phase with the fundamental and in Fig. 226(b) the phase of the harmonic is reversed. The building up of a complex curve from its harmonic components is an easy matter. The reverse process, in which a given curve is analyzed and the amplitudes and phases of its constituents obtained, is not so simple.

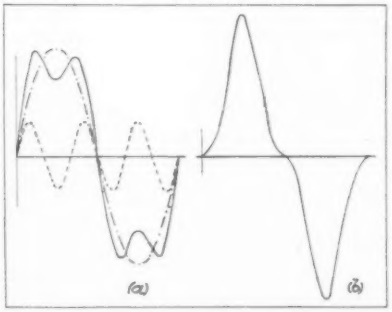


Fig. 226. Influence of third harmonic (a) in phase, (b) in opposition.

Fourier's theorem states that if a single valued periodic curve—that is, one having only one value of the ordinate to one value of the abcissae and repeating itself at regular intervals—is taken, then no matter how irregular the curve may be and provided that there are no discontinuities, the curve may be represented by adding the ordinates of superimposed sine curves of suitable amplitudes and phase differences.

Thus $y = f(x)$
$= a_0 + a_1 \sin \theta + b_1 \cos \theta$
$+ a_2 \sin 2\theta + b_2 \cos 2\theta + \ldots$

Before dealing with this equation there are a few theorems which must be understood. Some of them have been dealt with in previous sections of this series. They are repeated here, in slightly different form, for convenience of reference.

Take the equation,

$y = A_n \sin 2\pi n. (t/T) \ldots 1.$

where A is a constant and t is the

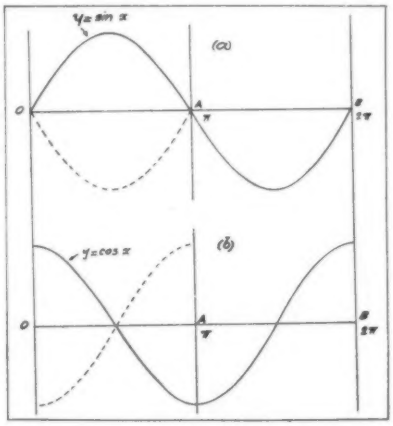


Fig. 228. Proof that mean value of sine and cos θ from 0 to 2π is zero.

elapsed time from the initial instant of time $t = 0$. A_n is the maximum value of the sine function (positive or negative); T is the time of one complete cycle (the periodic time); $2\pi n\ (t/T)$ is an angle which changes from zero to $2\pi n = n \times 360°$ while t increases from 0 to T (see Fig. 227).

The sine curve passes through n cycles in a time, T, where n may be 1 or any other integer and the time of each cycle is T/n. In the case represented by Fig. 227, $n = 1$ and $y = A. \sin 2\pi. (t/T)$.

The angle corresponding to a whole cycle is 360° or 2π radians, and the angle at the instant, t, is (t/T) of this, for

$\theta : 2\pi = t : (1/n)$
and $\theta = 2\pi nt$ or, since $T = 1/n$,
$\theta = 2\pi(t/T)$

(a) The mean value of sine θ or

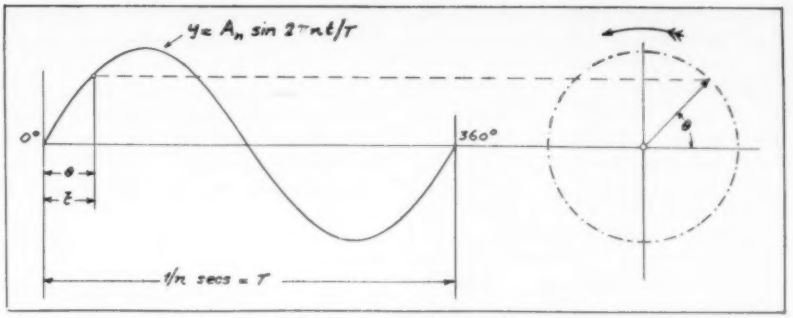


Fig. 227. The expression of a sine curve in terms of time.

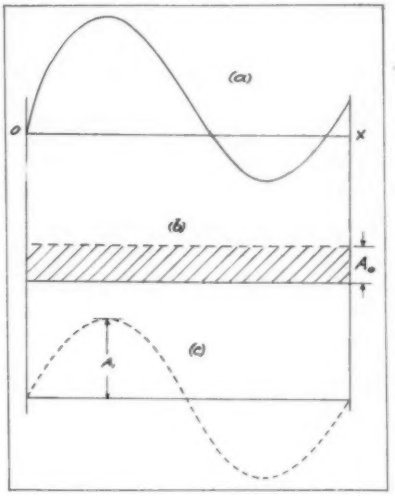


Fig. 229. Evaluation of average term in a sine curve.

cosine θ over a period equal to 2π is zero.

This is at once evident by Fig. 228, (a) and (b), where the period, 2π, is divided in two and the two portions of the curves superposed. The resultant is zero.

(b) A curve which is not symmetrical about the X axis will be found to contain an average term.

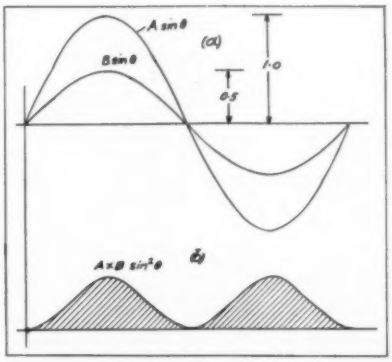


Fig. 230. Product of two sine curves in phase.

Fig. 229(a) shows a periodic curve which is not symmetrical about the axis OX. By taking the algebraic sum of the ordinates and dividing by the length of the base line, OX, an average term A_0, Fig. 229 (b), is obtained. Subtracting A_0 from the original curve, a sine curve, Fig. 229(c), results. The equation to the original curve is thus

$y = A_0 + A_1 \sin \theta$

A_0 could have been obtained graphically by drawing two horizontal lines parallel to the OX axis and touching the two positive and negative maximums of the original curve. A vertical line joining the two horizontal lines is drawn and bisected. A third horizontal line through this bisection is the true base line of the sine curve, and its distance from the base line of the original curve gives the value of the average term.

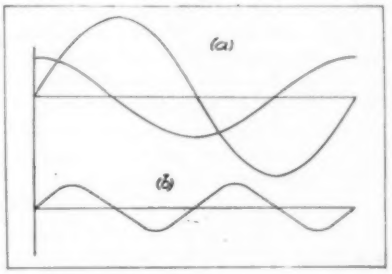


Fig. 231. Product of two sine curves in quadrature.

If there had been sine curves of other frequencies and amplitudes present, the curve of Fig. 229(c) would not have been a simple sine curve but would have had ripples indicating the existence of the other components. Thus, referring to Fig. 226, the resultant curve has three peaks and two valleys, the three peaks indicating the presence of a third harmonic.

Fig. 230(a) shows two sine curves in phase and of the same frequency, having amplitudes A and B. Fig. 230(b) is their product $A \times B. \sin^2\theta$. This curve is wholly positive. The

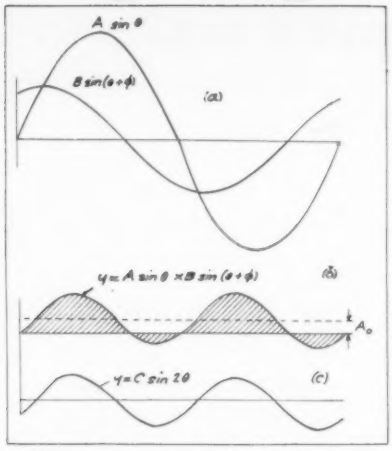


Fig. 232. Product of two sine curves with an angle ∅ between them.

mean value of the product is 0.25, for the mean value of $\sin^2\Theta$ is $\frac{1}{2}$ and A = 1, B = 0.5. Therefore, 0.5 × 1 × 0.5 = 0.25, and

(c) The mean value of the product of two sine curves in phase with one another is the product of their maximum values multiplied by 0.5.

Fig. 231(a) represents two sine curves having the same frequency but a phase difference of $\pi/2$ (in quadrature with one another). Fig. 231(b) is the product, and the mean value of this is obviously zero. Therefore:

(d) The mean value of the product of two sine curves in quadrature with one another is zero.

Fig. 232(a) shows two sine curves of the same frequency but with a phase difference of ∅ (less than 90°). Fig. 232(b) is the product curve, which is seen to be unsymmetrical with respect to axis OX. There is, therefore, an average term, A_o. Subtracting this from Fig. 232(b) the double frequency curve Fig. 232(c) results. The mean value of this is obviously zero, and

(e) The mean value of the product of two sine curves having a phase difference ∅ between them is the average term whatever this may be.

The foregoing matter commencing with the paragraph containing equation (1) can be made perfectly general in the following manner:

Referring to Fig. 233, let

$y_1 = OA \sin wt$

$y_2 = OB \sin (wt-\Theta)$

Then,

$y_1 \times y_2 = OA \sin wt \times OB \sin (wt-\Theta)$

OB can be resolved into components

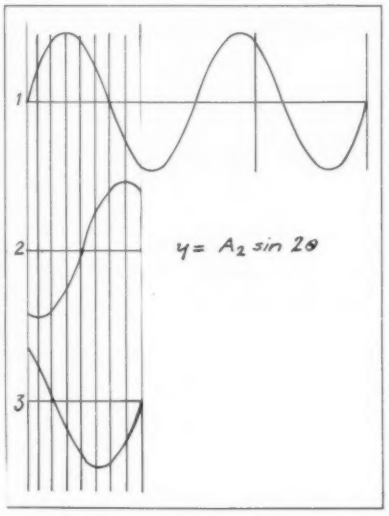


Fig. 234. Graphical analysis by superposition.

OC, OD in quadrature with one another. Then,

$OB = OC \sin wt + OD \sin [wt-(\pi/2)]$

Therefore,

$y_1 \times y_2 = OA \sin wt [OC \sin wt + OD \sin (wt - \pi/2)]$

$= OA.OC \sin^2 wt + [OA \sin wt \times OD \sin (wt - \pi/2)]$

The mean value of the first term is (by theorem c) 0.5 OA.OC, while that of the second is zero by theorem (d). But OC = OB cos Θ; therefore, the mean value of $y_1 \times y_2 = 0.5$ OA.OB.cosΘ. Therefore,

(f) The mean value of the product of two sine curves is half the product of their maximum values multiplied by the cosine of the angle Θ between them.

If Θ = 0, cos Θ = 1, and $y_1 \times y_2$ = 0.5 OA.OB (theorem c)

If $\Theta = \pi/2$, cos Θ = 0 and the mean value of $y_1 \times y_2 = 0$ (theorem d)

If Θ lies between $\pi/2$ and 0, then, as proved above,

mean $(y_1 \times y_2) = 0.5$ OA.OB. cosΘ.

Let y = sin nΘ or cos nΘ, where n is an integer. If n = 1, the sine curve reaches its positive maximum at $x = \pi/2$ and its negative maximum midway between $x = \pi$ and $x = 2\pi$.

If n is greater than unity, say 3, then the curve y = sin 3Θ reaches its positive maximums at $\Theta = (1/6)\pi$, π, $(3/2)\pi$, etc., while the negative maximums occur at $\pi/2$, $(7/6)\pi$, $(11/6)\pi$, etc.

The mean value of such expressions as y = sin nx × sin mx, where n and

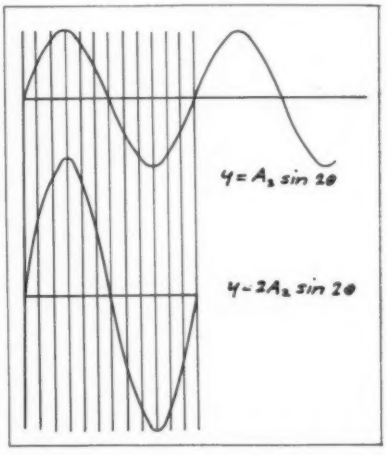


Fig. 235. Graphical analysis obtaining 2nd component.

m are integers or y = sin nx × cos mx, can be arrived at very easily. Sin nx × cos mx = (1/2) sin (n + m)x + (1/2) sin (n-m)x, and the mean value of this is 0 + 0.

In the same way the expressions for sin nx or cos mx multiplied by sin mx or cos nx may be shown to have a mean product which is zero.

Practical Methods of Harmonic Analysis

A practical method of harmonic analysis is by superposition.

Fig. 234 represents the curve $y = A_2 \sin 2\Theta$; that is, the curve occurs twice in the period 0 to 2π, which is the period of the fundamental curve (not shown).

If this curve is divided into three portions and these are superposed, the

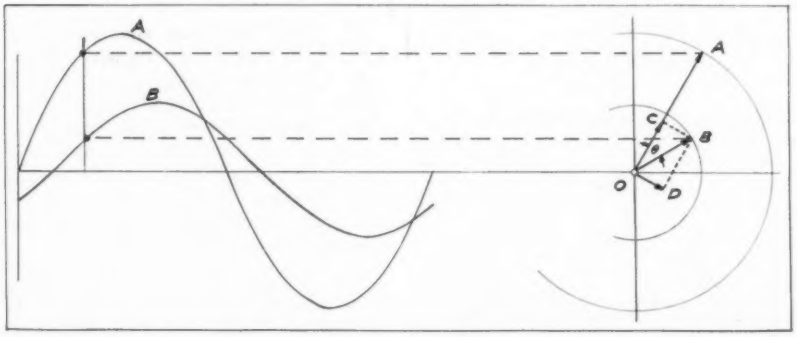


Fig. 233. Proof of generalized expression for the product of two sine curves with an angle ∅ between them.

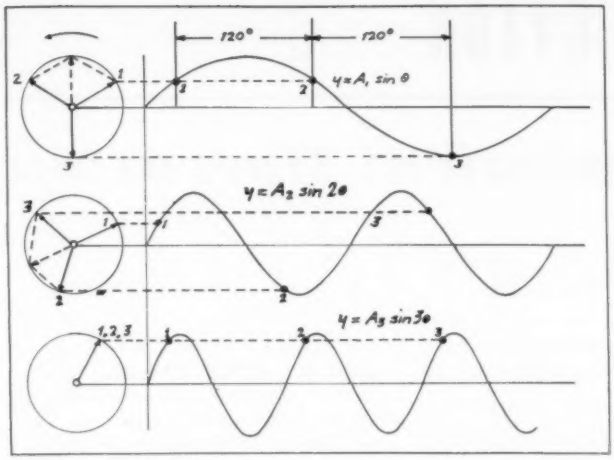


Fig. 236. Vectorial proof of principle of superposition.

algebraic sum of all the ordinates is zero. If the curve is divided into two portions which are superposed and added, the curve is reproduced with its amplitude doubled, Fig. 235.

The reason for this is readily established. Dividing the curve into three portions, $y_2 = A_2 \sin 2\theta + A_2 \sin (2\theta + 2\theta/3) + A_2 \sin (2\theta + 4\pi/3)$ = 0, since the mean value of $A_2 \sin 2\theta$ from 0 to 2π is zero. When the curve is divided into two portions, superposed and added (Fig. 235), $y_2 = A_2 \sin 2\theta + A_2 \sin 2(\theta + \pi)$.

Now $\sin n(\theta + \pi) = \sin (n\theta)$ when $n = 2, 4, 6, 8$, etc.; that is, when n is even. Therefore, $y_2 = 2A_2 \sin 2\theta$, and A_2 is half the maximum ordinate of this curve.

Fig. 236 shows three curves: a fundamental, $A_1 \sin \theta$; the first harmonic, $A_2 \sin 2\theta$, and a second harmonic, $A_3 \sin 3\theta$.

If the period of the first or fundamental is divided into three portions, the superposition will be effected within the limits 0 to 120°. The three portions of the curve may be regarded as being generated by three rotating vectors. The three vectors of the curve, $y = A_1 \sin \theta$, will be 120 degrees apart; and the algebraic sum of their projections on the vertical will be equal to zero at every instant. Also the resultant of vectors 1 and 2 will be equal and opposite to 3.

The three vectors of the curve, $y = A_2 \sin 2\theta$, will also be 120 degrees apart with the same result. The vectors of $y = A_3 \sin 3\theta$ will all coincide so that the maximum amplitude of the curve resulting from them will be $3A_3$.

Fig. 237 represents the curve, $y = A_1 \sin \theta + A_2 \sin 2\theta$. It is symmetrical about the OX axis so that there is no average term. Dividing it into two portions, superposing and adding them, curve (4), which is $2A_2 \sin 2\theta$, results. Dividing the amplitude by 2, curve (3) is obtained; and subtracting this from curve (1), curve (2), the fundamental is yielded. There is no need to carry out the work graphically as in the example just given. The process can be effected arithmetically by forming a suitable schedule. Thus, let the original curve be as follows:

Ordinate No.	1	2	3	4	5	6	7	8	9	10
y	1.56	3.75	4.0	2.91	1.13	—1.13	—2.91	—4.0	—3.75	—1.56

The arithmetical equivalent to superposing the two halves of the curve graphically is to add the ordinates 6 to 10 to those of 1 to 5. The result divided by 2 will give the varying values of the first harmonic.

TABLE I.

A	B	C=A+B	C/2
1.56	—1.13	0.43	0.215
3.75	—2.91	0.84	0.42
4.0	—4.0	0.0	0.0
2.91	—3.75	0.84	—0.42
1.13	—1.56	—0.43	—0.215

The mean value of C/2 is found by taking the *arithmetical* sum of its ordinates and dividing this by 5. This is 1.270/5 = 0.254. The mean ordinate x of a sine curve is given by its amplitude A multiplied by $(2/\pi)$; therefore, $A_2 = 0.254 \times (\pi/2) = 0.4$.

(Please turn to page 33)

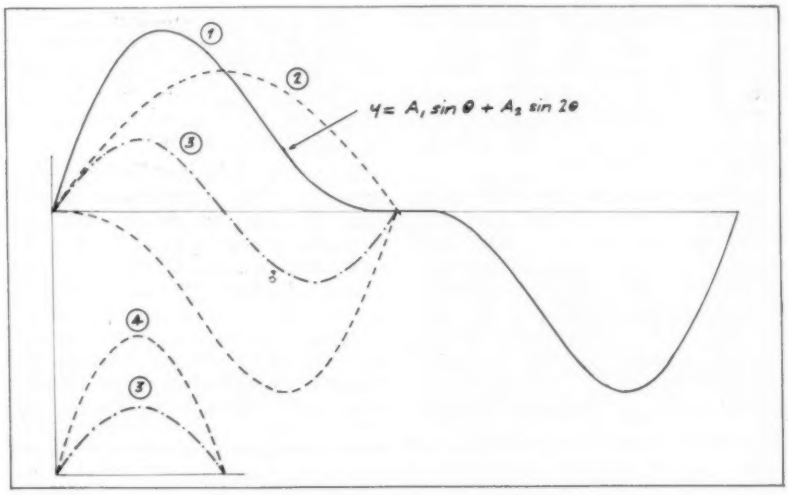


Fig. 237. Analysis of a curve by superposition.

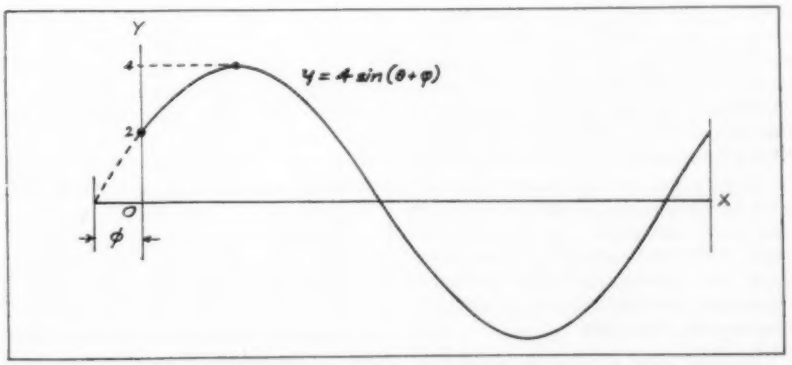


Fig. 238. Method of obtaining initial angle Ø of a curve.

LONG-SPAN CONSTRUCTION

Aids Economical Operation

By WALTER DAKIN

General Plant Superintendent, Central Group Operating Companies of General Telephone System, Madison, Wis.

***THE PROBLEM** of economical operation is predominant among the many problems confronting companies operating in rural areas and small communities. The development of higher strength iron telephone wire has brought with it long-span construction as a method of reducing line construction costs. Address before annual convention of the Wisconsin State Telephone Association*

IN WISCONSIN there are approximately 750 separate companies operating 665 central offices and 528,300 stations. The majority of these companies operate in rural areas and small communities, and they are confronted with the same problems that confront the companies operating in the larger places.

As the problem of economical operation has become more acute in the last few years, greater effort has been devoted to the engineering and planning of telephone plant to improve the service and to make savings in construction and operating costs. One of the most practical ways of reducing costs in the rebuilding or extension of rural plant facilities is through the use of higher strength iron wire and longer spans.

Pole spacing is one of the most important elements affecting the cost of rural construction. The lighter the wire load, the larger becomes the ratio of the cost of the pole structure to the overall line cost. Generally speaking, the cost of the pole portion of the line varies inversely with the pole spacing and, therefore, the use of longer spans is the most obvious means of reducing line costs.

Long span construction can be used to advantage in the reconstruction and extension of open wire lines, both on bracket and crossarm leads. Over railroads and main highways, the span should not exceed approximately 150 feet.

The iron wire ordinarily used for rural telephone lines is of the BB grade (tensile strength 53,000 lbs. per sq. in.) which has a breaking load of about 500 pounds for the .109 size. The span lengths used with BB wire are generally restricted to between 130 and 150 feet, with a maximum of about 180 feet. Therefore, in rebuilding leads which contain wire of regular BB grade, it will be necessary to restrict the span to approximately 180 feet.

A higher strength steel line wire known as HTL-85 (tensile strength 85,000 lbs. per sq. in.), having a breaking load of about 800 pounds for the .109 size, has been available to Independent companies for the last two years. This higher tensile strength permits the use of spans averaging up to 250 feet in heavy loading areas. These longer spans will not sacrifice the safety of the plant if specified sags and stringing tensions are carefully observed. Special care must be taken to see that guys are properly designed and correctly installed.

Early this year a still higher strength steel line wire known as HTL-135 (tensile strength 130,000 lbs. per sq. in.) became available to Independent telephone companies. This wire has a breaking load of about 1,200 pounds for the .109 size, which permits span lengths averaging up to 350 feet in heavy loading areas.

This extra high strength wire has been used by Bell companies for several years, but the problem of suitable sleeves and sleeve tools has retarded its adoption by Independent operating companies.

In using this new extra high strength wire, compression sleeves must be used to develop the full strength of the wire. Tests indicate a loss in strength of 10 per cent or more through the use of twisted sleeves. Manufacturers are now developing a galvanized steel compression sleeve capable of holding the maximum breaking strength of this wire, and also a combination tool

Wire Stringing Sags—Heavy Loading Area—For Span Lengths Averaging Between 151 Feet and 200 Feet

Span Length, Feet	Temperature—Degrees Fahrenheit: 100	90	80	70	60	50	40	30	20	10	0	—10
	Sag—Inches											
151	18½	17	16	14½	13	12	11	10	9	8½	7½	7
160	21	19½	18	16	15	14	12½	11½	10½	9½	9	8
170	23½	22	20½	18½	17	15½	14	13	12	11	10	9½
180	26½	24½	23	20½	19	17½	15½	14½	13	12	11	10½
190	29½	27	25½	23	21	19½	17	16	14½	13½	12	11½
200	33	30	28½	25½	23½	21½	19	18	16	15	13½	13

For Span Lengths Averaging Between 201 Feet and 250 Feet

Span Length, Feet	Temperature—Degrees Fahrenheit: 100	90	80	70	60	50	40	30	20	10	0	—10
	Sag—Inches											
210	34	32	30½	28	26	24½	22½	21	19½	18	16½	15½
220	37½	35	33	31	28½	27	25½	23	21½	20	18½	17
230	41	38½	36	34	31½	29½	27	25	23½	21½	20	18½
240	44½	41½	39	37	34	32	29½	27	25½	23½	22	20
250	48½	45½	42½	40	37	34½	32	29½	28	25½	23½	22

Table I. Recommended wire stringing sags for the HTL-85 telephone line wire. Tensile strength of the HTL-85 wire is 85,000 pounds per square inch.

Wire Stringing Sags—Heavy Loading Area—For Span Lengths Averaging Between 250 Feet and 350 Feet

Span Length, Feet	Temperature—Degrees Fahrenheit											
	100	90	80	70	60	50	40	30	20	10	0	—10
	Sag—Inches											
250	21½	20	19	18	16½	15½	14½	14	13	12½	12	11½
260	23	22	20½	19	18	17	16	15	14	13½	12½	12
270	25	23½	22	21	19½	18	17	16	15	14½	14	13
280	27	25	24	22	21	19½	18	17½	16½	15½	14½	14
290	29	27	26	24	22½	21	20	19	18	17	16	15
300	31½	29	27½	25½	24	22½	21	20	19	18	17	16
310	33½	31	29	27	25½	24	22½	21	20	19	18	17
320	36	33	31	29	27	25½	24	23	21½	20½	19½	18½
330	38	35	33	31	29	27	25½	24	23	22	20½	19½
340	40	37½	36	33	31	29	27	25½	24½	23	22	20½
350	43	39½	37	35	32½	30½	28½	27	26	24½	23	22

Table II. Recommended wire stringing sags for the HTL-135 telephone line wire. Tensile strength of the HTL-135 wire is 130,000 pounds per square inch.

which may be used on sleeves for either the HTL-85 or HTL-135 wire.

Sags and Tensions

With the increased strength in wire and joints, the new wire can be pulled tighter so that increased pole height is not normally required, even with greatly increased span lengths. The recommended wire stringing sags for both the HTL-85 and the HTL-135 telephone line wires are given in Tables I and II.

The tension in HTL-135 wire under specified stringing sags will represent an appreciably lower percentage of its fatigue limit under both normal and cold weather conditions than will the tension in copper wire or BB iron wire in 150-foot spans under the same conditions. Also, the increase in sag in a 350-foot span of .109 high strength steel wire under heavy loading will be somewhat less than in a 150-foot span of .104 copper wire exposed to the same loading.

Because of the increased tensions in longer spans, the guying required must be carefully considered. The present practice is to double the number of wires considered and compute the guy strength required from the guy rule and guying tables in general use. That is, a line designed for an ultimate capacity of two wires should be guyed in accordance with present tables for four wires, and a 10-wire line of high strength wire should be guyed in accordance with present tables for 20 wires, etc.

Some development work has been done on a special top groove insulator for long-span construction, and it is probable that considerable advantage will be found in the use of an armor tie. Until definite information is available, however, it appears satisfactory to use the present type of insulators with the regular open-wrap horseshoe tie, using a special soft galvanized tie wire, 14 inches long.

Swinging contacts are not considered a factor where standard construction practices are followed, and conditions such as single pins and transposition insulators which invite trouble are avoided.

Reconstruction of Existing Lines

In the case of rebuilding existing aerial wire lines, the full economy of long-span construction is generally limited to two or possibly four wire lines, for the reason that generally wires in leads with more circuits are not all uniformly bad and in need of replacement at the same time. Therefore, the economy of transferring the lower strength wire still in serviceable condition to poles spaced not to exceed 180 feet, must be balanced against the use of longer spans and fewer poles.

In bracket leads where both wire and poles are being replaced, the new poles can be spaced almost independently of the old ones. However, if the wire only is being replaced and many poles are still sound, it will probably be found desirable to remove every other pole, and such good poles as are removed can be reused in the same area. Slight irregularities in pole spacing are not objectionable, and occasional spans may vary up to 50 per cent from the average span without affecting the design.

The amount of strength built into the pole line is an important factor. It is frequently found that the rural bracket lines are greatly overbuilt, and that the heavier crossarm leads are greatly underbuilt. In the case of bracket lines, with an ultimate requirement of only four wires, class 9 and 10 poles are adequate for spans up to 350 feet.

To obtain the maximum economy in the pole plant, it is necessary that the minimum class and length pole be employed which will meet the strength and clearance requirements, weighing carefully the ultimate load for the line. In all cases, minimum ground clearances specified by the state electrical safety codes must be provided.

Provision of Additional Facilities

The replacement of brackets with crossarms to accommodate additional wire preserves or actually improves clearances up to a full arm of wire. Obtaining satisfactory clearances is often a problem when facilities in excess of a full crossarm of wire are necessary.

The new high strength steel wire permits the use of smaller wire sags than formerly. One expedient is to use high strength wire for the new facilities and place it, with its smaller required sags, above the existing wire. The smallest clearance between wires under all conditions is then at the pole where it can cause no trouble, and the pole attachments can be close spaced.

In districts where the line is located relative to fences, ditches, embankments, etc., so that the ground underneath is accessible to pedestrians only, it has been found practical to construct lines with ground clearances of as little as 10 feet. Where this clearance has been adhered to, the pole lines have been erected at a minimum cost. This is one foot more clearance than the nine feet generally required but is done to eliminate the necessity for pulling slack from the wires after storms.

On this basis, it should be practicable to construct lines using 350-foot spans with poles as short as 18 or 20 feet. Normally, 25-foot poles will provide a 15-foot clearance, which is generally adequate for rural districts. Wherever possible, advantage should be taken of ground irregularities to obtain maximum ground clearances with minimum height poles.

Aside from any difference in material costs, the use of poles of a greater length and higher class than the minimum requirement results in additional costs for handling, setting, and digging deeper pole holes. For example, a 25-foot pole requires a 50 per cent deeper hole than an 18-foot pole, and the weight of a 25-foot, class 7, pole is about twice that of an 18-foot, class 9, pole.

Therefore, if a 25-foot, class 7, pole is used in a location where an 18-foot, class 9, pole would meet the minimum requirements, it would be

Heavy Storm Loading Areas

Class of New Creosoted Southern Pine Poles

Number of Wires	Average Span Length in Feet						
	150	175	200	225	250	300	350
1-2	10	10	10	10	10	10	10
3-4	10	10	10	10	10	10	10
5-10	9	9	9	9	9	7	7

Heavy Storm Loading Areas

Class of New Untreated Cedar Poles*

Number of Wires	Average Span Length in Feet						
	150	175	200	225	250	300	350
1-2	10	10	10	9	9	9	9
3-4	10	10	10	9	9	9	9
5-10	7	6	6	6	6	5	5

*Based on average life expectancy of 20 years.

Note: Since Class 9 and 10 poles do not have a minimum-butt dimension specified, it will be necessary to select poles which are of average size or better for the longer spans. Poles of less than average size should not be used in spans in excess of 175 feet.

Table III. Recommended minimum class treated and untreated poles for the heavy loading areas and span lengths indicated. No consideration has been given to treated cedar poles. In general, however, AA butt-treated cedar poles of one class smaller than specified for untreated cedar poles may be used where available.

necessary to handle a pole of more than double the weight, and provide a hole 50 per cent deeper than otherwise. Also, generally speaking, from a wind exposure and strength standpoint, a low line is preferable to a high one.

The recommended minimum class treated and untreated poles for various span lengths in the heavy loading area, which includes Wisconsin, are given in Table III. Table IV gives the recommended minimum class of anchor guyed poles and stubs to be employed in pole line work.

Western Union type wooden pole brackets, size 2 ins. by 2⅜ ins. by 12 ins., should be used on all lines with an ultimate load of four wires or less. At corner poles, brackets should be secured to the pole by two wraps of .109 line wire which may be fastened to the pole with galvanized guy staples. Metal bracket straps are also available for reinforcement.

Where the ultimate load is from five to ten wires, a 10-pin pony crossarm may be used for span lengths averaging up to 200 feet. A 10-pin standard crossarm should be used for span lengths averaging more than 200 feet. In the event that sidearm construction is necessary, a class 7 treated pole or a class 6 untreated pole should be used.

Where crossarms are employed, standard double-arm construction should be used. Where the line to be dead-ended is of bracket construction, it should be dead-ended on a No. 502 strain insulator. This strain insulator may be fastened to the pole with two wraps of .109 steel line wire so that it will not be over one foot from the face of the pole.

The ends of the wraps may be fastened with a 1¾ inch .109 Nicopress galvanized steel sleeve, and the wraps should be secured to the pole with galvanized guy staples. The line wire may be looped through the insulator and fastened with 1¾ inch galvanized Nicopress dead-ending sleeves. A through bolt with an insulator and clevis assembly is also available for dead-ending purposes.

Joint Use of Poles

In general, joint occupancy of poles with power companies is not practicable in rural areas, either from a structural or inductive standpoint. However, to avoid difficulties from induction, as well as unnecessary crossings and other situations of proximity, it is desirable to carry out cooperative advance planning with other wire-using companies, and with state and county highway engineering and beautification departments.

In all joint construction careful consideration should be given to the nature of the power circuits involved and the economy of joint use. Inasmuch as all brackets must be on the same side of jointly-used poles, 24 inch separation should be provided for spans of more than 200 feet to prevent swinging crosses. Clearances between power and telephone wires and the ground clearance for the telephone wires must be maintained strictly in accordance with the state electrical safety codes.

The use of HTL-85 wire with spans up to 250 feet has shown savings of over 20 per cent in cost over previous construction with spans averaging between 150 and 180 feet.

Although at present the HTL-135 wire lists at approximately 25 per cent more than the HTL-85 wire, it is believed that when suitable tools and sleeves, which will develop the full strength of the wire, are available to Independent companies, approximately 10 per cent additional savings in rural line costs can be expected from the use of spans averaging up to 350 feet.

Therefore, while the use of the HTL-85 wire in spans up to 250 feet, and HTL-135 wire in spans from 250 feet to 350 feet, is recommended as a means of effecting considerable economy in rural line construction, the importance of careful advance planning should be emphasized.

Small economies are relatively important, and care must always be exercised to insure that all engineering, right of way, and construction details are carefully considered in advance, and that the work is efficiently executed to achieve the greatest overall economy in rural line construction.

Ratio of Lead/Height of Anchor Guys	Sum of Anchor Guys	Minimum Class of Anchor Guyed Pole or Stub Length of Pole					
		16	18	20	25	30	35
1	2.2M or less	10	10	10	10	9	7
	6M	10	10	9	9	7	7
	10M	9	9	7	7	7	7
	16M	9	9	7	7	7	6
Less than 1	2.2M or less	10	10	10	10	9	7
	6M	10	10	9	7	7	7
	10M	9	9	7	7	7	7
	16M	9	7	7	6	6	6

Table IV. Minimum class of anchor-guyed poles and stubs to be employed in pole line work. Corner or dead-end poles shall in no case be smaller than the line poles. Anchor guyed stubs to corner poles should be selected without regard to the size of line poles.

WALTER S. GIFFORD, retiring president of the Telephone Pioneers of America and president of the American Telephone & Telegraph Co., in an address stated that the Bell companies "were pioneers in recognizing the social responsibilities of business in a democracy."

JOHN J. ROBINSON, new president of Telephone Pioneers of America, entered the business as a cable-splicer and is now president of the New England Telephone & Telegraph Co.

Telephone Pioneers

Elect New Officers

JOHN J. ROBINSON, president of the New England Telephone & Telegraph Co., Boston, Mass., was elected president of the Telephone Pioneers of America at the meeting of 275 delegates of the 18th annual general assembly September 22, at Hotel Commodore, New York City. James Hollis Brace, vice-president of the Bell Telephone Co. of Canada, was elected senior vice-president. The assembly also elected 14 others as vice- presidents as follows:

John Alonzo Acord, Mountain States Telephone & Telegraph Co.; Harold J. Barber, Ohio Bell Telephone Co.; Sewell W. Black, Southwestern Bell Telephone Co.; Miss Alice E. De Muth, Western Electric Co.; Miss Julia I. Dwyer, Northwestern Bell Telephone Co.; Henry Gallois, Southern Bell Telephone & Telegraph Co.; L. W. Germain, Illinois Bell Telephone Co.;

Lowell Johnson, Michigan Bell Telephone Co.; Chester A. Kelly, Pacific Telephone & Telegraph Co.; Frank P. Lawrence, New York Telephone Co.; Miss Bessie Edith Loomis, Indiana Bell Telephone Co.; F. E. Martin, New Jersey Bell Telephone Co.; Harry C. Ross, Chesapeake & Potomac Telephone Co.; and Miss Mary E. Wilhelm, Bell Telephone Co. of Pennsylvania.

Walter S. Gifford, president of the association for the year 1939, will serve on the executive committee during the coming year.

J. L. Kilpatrick, president of the New York Telephone Co., and past president of the Pioneers, welcomed the delegates at the opening session.

An audience of 5,000, gathered at the Commodore, Astor and Roosevelt hotels in Manhattan and at the St. George Hotel in Brooklyn, was addressed on the evening of September 22 by Walter S. Gifford, president of the American Telephone & Telegraph Co., through a wire hook-up of the public address systems of the four hotels.

"Besides this technical development in which we are recognized as having led the world," Mr. Gifford said, "there are other achievements in which we have pioneered and which, in my opinion, have been of great importance to the general welfare of our country."

As examples of the sort of pioneering that has characterized the growth and improvement of the telephone industry in this country, he pointed to adoption years ago of a fixed depreciation charge to expenses before arriving at net earnings available for dividends, and adoption in 1913 of the Bell System's benefit plan.

He included in these examples, the maintenance by the Bell System, practically from the start of the industry, of manufacturing and purchasing departments to insure a dependable supply of materials and equipment and the early establishment of a central organization for research and development.

He also spoke of the telephone industry as a pioneer in "courtesy in business" and in the development, as early as 1908, of a type of advertising that has become known as "institutional."

The Bell System's practice of depreciation accounting, Mr. Gifford said, has been of great importance in the maintenance of the financial integrity of the Bell System and in the rapidity with which new and improved methods have been adopted.

The benefit plan, he said, was a step "far out in front" in 1913. At a time when even accident compensation insurance was just getting under way, the Bell System benefit plan provided for definite payments to employes in case of accident or sickness and to dependents of employes in case of death, and for pensions after retirement.

About twelve years ago an accrual plan for pensions was adopted as contrasted with the pay-as-you-go plan. Trustees of the plan now have some $265,000,000 held solely for pension purposes, he said.

"One hears a good deal about the recognition on the part of business —big business especially—of its so-

(Please turn to page 25)

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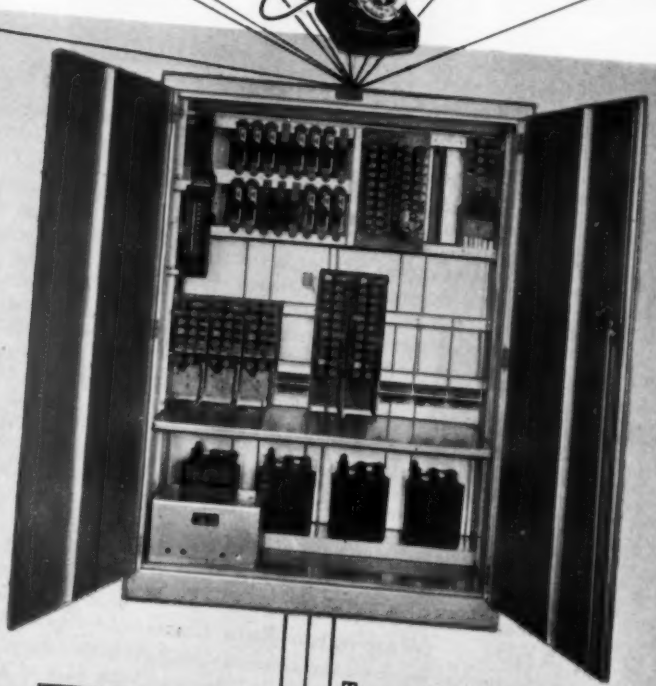

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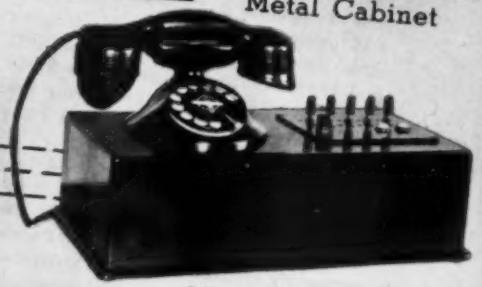

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Commission and Court Activities

Andrews Reported Out of Wage-Hour Administration

Newspaper dispatches from Washington during the past two weeks have carried reports that Administrator Elmer F. Andrews of the Wage-Hour Act would be transferred to some other position. Both President Roosevelt and Mr. Andrews have refused comment, but the reports persist.

A United Press dispatch from St. Paul, Minn., under date of September 23, stated that an authoritative source close to Col. Philip Fleming, United States district engineer in St. Paul, said he had been appointed wage-hour administrator to replace Mr. Andrews.

▼ ▼

Testimony Presented in Washington Rate Case

Despite research and technical development work of the Bell Telephone Laboratories, Inc. that resulted in great economies in the past several years, Pacific Telephone & Telegraph Co. plant and equipment values in Washington state more than doubled between 1922 and 1938, according to testimony given September 12 at the rate hearing being conducted by the Washington State Department of Public Service.

H. G. Sheppard, commercial engineer of the Bell Laboratories, testified under cross examination that numerous improvements in the Pacific company's systems have been instituted in the past several years with resulting savings.

The prosecutor's office, the state department of public service and the Pacific company reached an agreement on September 13, on the question of installing metering equipment for tests at the University of Washington.

Otto B. Rupp, general counsel for the Pacific company, announced the agreement, depending upon fulfillment of six conditions, among them the stipulation the company must be given 20 days' notice before beginning installation.

Other conditions were: All equipment installed must remain the property of the company; no test may be made without the presence of telephone company officials and counsel, representatives of the King County prosecutor's office and representatives of the department; the equipment must be adjusted and maintained by company experts; the test must be conducted externally from a company exchange, but under the same conditions as in actual use, and results of all tests must be made available to all parties interested.

Because there was no objection to any of the conditions, it was considered probable the equipment will be installed within a month.

Mr. Rupp, on September 13, began the task of choosing from among more than 74,000 vouchers and journal entries—eight trunkfuls of records representing one year of business for the American Telephone & Telegraph Co. —facts which would be pertinent to the hearing.

V. L. Sylliaasen, general traffic manager for the Pacific company's Washington-Idaho area, testified about traffic expenses, saying the $2,109,424.29 paid in 1938 to 1,860 telephone operators in Washington was 81.83 per cent of all traffic expense in the state. Mr. Sylliaasen said the 1,860 operators in 1938 handled 237,000,000 telephone calls, and that 95 new operators were added during the year.

Testimony at the hearing on September 14 concerned an alleged "misjudgment" on the part of the A. T. & T. Co. which cost the Pacific company thousands of dollars above the cost estimate furnished in connection with the installation in Seattle of certain automatic dial telephone equipment in 1921.

E. E. Browning, Jr., plant extension engineer of the A. T. & T. Co. testified that an estimate of $96 a line, or a total of $549,000, was made by the parent company in 1919 in proposing installation of the automatic dial system. The cost of installation in 1921, including three automatic central offices, was $883,000, or $176 a line, the witness testified.

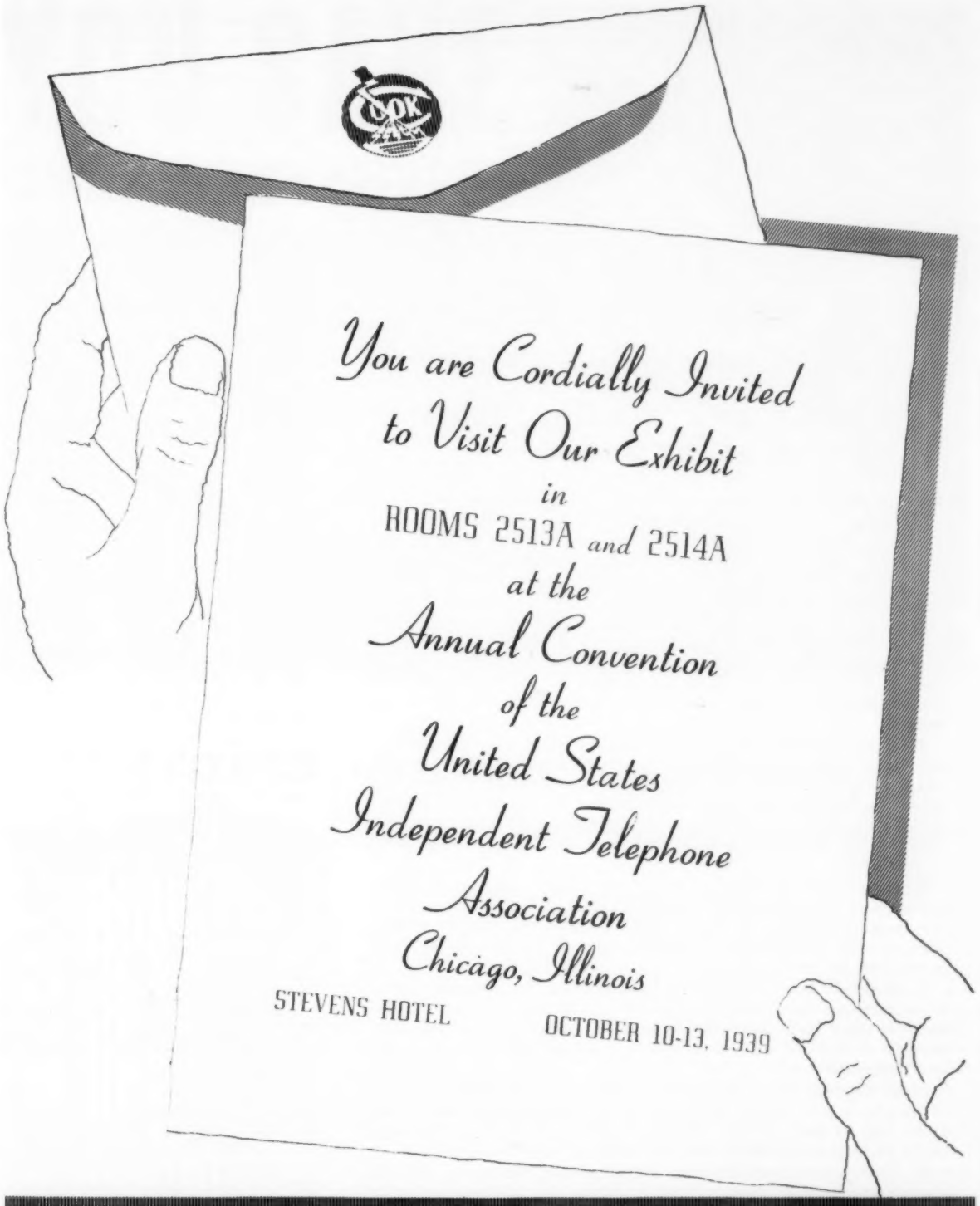
Mr. Rupp objected to the testimony entered under cross-examination of the witness by Albert Stephan, counsel for the state department of public service, on the grounds that the expenditures for installation of an automatic dial system previously had been adjudicated. He objected, also, on the ground that Mr. Stephan was attempting at the present hearing to "delve into ancient history."

An attempt to show that the A. T. & T. Co. sold associated telephone companies, including the Pacific company, "faulty" instruments to test the instruments experimentally, was made as the rate hearing continued on September 15.

Counsel Albert E. Stephan, of the state department of public service, cross-examined H. G. Sheppard, of the Bell laboratories, at length about handsets manufactured by the company in 1937 and 1938. Mr. Sheppard testified that design and technical manufacture of the handset device were changed 40 times in the two years. Chief difficulty in attempting to perfect the device, he explained, was in eliminating moisture, which made some of the handsets faulty.

He said the associated companies were notified by letter that the handset instruments still were in the experimental stage.

On September 18, the voluminous financial records representing expenditures of the A. T. & T. Co. for 1938, were accepted as evidence. Otto B. Rupp, counsel for the Pacific company,



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introduced the records—contained in eight steamer trunks—over the objections of counsel representing the county, the city and the Telephone Users' League.

That the Pacific company plans to construct its central office headquarters in 1945 on property purchased more than nine years ago, was disclosed at the telephone rate hearing on September 19. J. M. Kenney, engineer for the company, testified that property purchased in May, 1929, is the site intended for the company's main offices.

The witness said that the company often buys property several years in advance of the time when the property is used by the company. The Pacific company's 1938 inventory listed value of the property at $315,982.

F. D. Tellwright, chief engineer of the Pacific company, testified that when the company purchased the site of its proposed new building, it expected a need of additional office space as headquarters for the Washington-Idaho territory. "Unfortunately business conditions retarded this development," he stated.

Ferd J. Schaaf, director of the department, denied Deputy Prosecutor Harry A. Bowen's motion that the Pacific company be required to furnish a breakdown of property into separate exchange areas—one of which would include Seattle.

Mr. Kenney then continued presentation of the company's summary of its property inventory, as totaled in the entire state, after it was ruled that the company "could not be required to enter its proof in any specific manner."

The bulky inventory, written on 77 typewriten pages, was read into the record.

▼ ▼

THE FOLLY OF A TELEPHONE TEMPER!

By Grace E. Armstrong

WONDER WHAT the telephone operator thinks about the human race in general? What does she think of us who nurse the private opinion that we never do or say anything to hurt another's feelings, yet in reality we show quick annoyance over the telephone when the service displeases us in any way—whether it is the operator's fault or not.

What a revival meeting it would be if we sinners—yes, I'd be there too—were called up front and made to repeat before an assembled audience our interpretation of the Golden Rule as we practice, or have practiced, it at times when we wanted a telephone number and did not get it the instant the number was out of our mouths.

What the operator may think of us, she must keep to herself—and does. She does not shout at us when the mistake is ours, or when we speak indistinctly, or stand so far from the telephone we cannot be heard, or move the receiver hook up and down so rapidly she has no chance to break in. The telephone operator has self-control. She is trained to serve us to the best of her ability under all conditions.

When we pick up the receiver, do we picture the operator as a human being, young usually, well-mannered? A girl whose duties are exacting, who has as much right to nerves as any other person, who at times must put up a heroic struggle to stifle an outburst in her own defense?

It is not so much in defense of the telephone operator that I write this but to point out *the folly of a telephone temper.* It uses up energy and tears down one's personal adequacy. It is a reflection upon us personally, and is unkind when a defenseless person has to suffer word abuse.

If we consider the human element, along with the machinery part of telephone service, we are going to achieve harmony which will prove that by one's mental attitude in this daily habit of telephone using we may attain better self-control in other things as well.

If we are a nation living upon our nerves, here is a national opportunity to train these nerves by letting the telephone operator be our object lesson, remembering that courtesy—like the springs on your car—amazingly eases the bumps and jolts of life.

(EDITOR'S NOTE: *Miss Armstrong worked 27 years at Reinbeck, Iowa, as operator and later as local manager. Although not now employed in the telephone industry, she is still very much interested in the work. The foregoing thoughts were written by Miss Armstrong for her local newspaper. Possibly other newspapers would like to publish this article if brought to their attention.)*

Northwestern Bell Sells Jefferson, Iowa, Properties

The chamber of commerce and the city council of Jefferson, Iowa, concurred in resolutions on September 19 approving the purchase of local properties of the Northwestern Bell Telephone Co. in the Jefferson and Dana territories by the Jefferson Telephone Co. Consolidation of the service will start immediately and it is planned to combine the services into one on December 25.

President W. H. Daubendiek, of the Jefferson company states that central office and station equipment were not included in the purchase. The company plans to install approximately 600 new telephones and a new four-position switchboard and to also remodel its central office.

The purchase of the Northwestern Bell properties by the Independent Jefferson company removes a dual service that has existed in the town for many years. Jefferson business men interested themselves in the telephone situation in September, 1938, when they passed a resolution favoring the unification of telephone service in Jefferson and vicinity.

Following passing of the resolution a committee was appointed by the chamber of commerce. Attitude of the public toward consolidation of the services and preference of companies was secured by means of a post-card mailing, sent out by the chamber of commerce.

▼ ▼

Michigan Bell Plans Purchase of Rural Company

The Michigan Public Service Commission on September 11, held a hearing on the proposed purchase of the Hillandale Telephone Co. in Berrien county by the Michigan Bell company.

Rate reductions ranging between 25 and 75 cents a month will result for present Hillandale rural line subscribers through the consolidation, if it is approved. The reductions will bring present rural rates of the Hillandale

(Please turn to page 27)

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Telephone Service of a Tennessee Suburban Town

By D. B. CORMAN
District Manager, Kellogg Switchboard & Supply Co.

GERMANTOWN, TENN., a beautiful village of approximately 1,000 population nestled in the aristocratic suburban district of Memphis, added another modern utility service when the Collierville Telephone Co. of Collierville cut into service a single-position Kellogg Masterbuilt junior switchboard.

The first telephone exchange was installed in Germantown about 15 years ago when there were but few houses in the community. D. G. Delaney, then manager of the Collierville Telephone Co., was far-sighted enough to see the possibilities of the area, even when dirt roads were the only connecting link with Memphis.

A few years ago a four-lane concrete highway was extended from the Memphis city limits almost to Germantown. Since then the community has developed rapidly—especially in regard to a high type of residential property. Most of the new homes are those of prominent business men of Memphis who desired to get away from the noise and confusion of the city to a residential district permitting large estates and finer homes.

In keeping with the modern water system, a fine electric plant and a new natural gas system, the telephone company decided that it should keep abreast of the march of progress by improving its service. The new service would be required to provide fast common battery service to those subscribers desiring it and at the same time be able to give improved magneto service on the rural lines.

The Kellogg Masterbuilt switchboard which was installed has a capacity for 200 lamp-signal universal lines and 40 combined drop-and-jack rural lines. At present, it is equipped with 90 lamp-signal lines and 10 combined drop-and-jack lines. It is wired and equipped with 15 full universal cord circuits arranged fortwo-party selective ringing by means of individual selecting keys associated with each cord circuit. The standard equipment of line pilots, automatic fuse alarm and night alarm is included.

MRS. D. G. DELANEY, manager and secretary of the Collierville Telephone Co., Collierville, Tenn.

Kellogg Masterbuilt junior switchboard equipped with universal lines similar to the one recently installed at Germantown, Tenn.

The exchange serves 110 local subscribers and has toll circuits connecting directly with Memphis and with the company's main exchange at Collierville.

Ample capacity is available in the new Masterbuilt switchboard to serve the community for a long time. If the present rate of growth continues to the point where more facilities are needed, the company can easily double its capacity by simply adding another single-position Masterbuilt junior non-multiple section alongside the present one.

Since the installation of the new equipment the telephone company has received many compliments on the improved service and new stations have been added. With the convenience of common battery service, improved supervisory facilities and better transmission, it is expected that station growth will continue steadily. Extension telephones are now much more desirable with the new common battery service and many of present subscribers are good prospects for them.

Mrs. Lucille Delaney, manager and secretary of the Collierville Telephone Co., has been very closely associated in the business for many years and is well prepared to carry on the far-sighted plans that have been made for the company's future.

The company owns a combination office and residence which houses the exchange. It was constructed last year in anticipation of the change to more modern equipment. The structure is of strictly residential design and in keeping with the modern residential development of the community.

TELEPHONE PIONEERS ELECT OFFICERS

(Concluded from page 17)

cial obligations," Mr. Gifford continued. "Apparently for many, this seems a new idea. At a time when other businesses were booming and stock split-ups and extra dividends were almost the order of the day, we stated definitely for the Bell System that either earnings in excess of those needed to assure the financial integrity of the business must be spent for the enlargement and improvement of the service or the rates must be reduced.

"That obligation, which includes fair treatment of employes, has been and will continue to be strictly lived up to. The inter-relation of the employe, the stockholder and the public and the rights of each have long been recognized by us, and we are, in my opinion, justified in feeling that we were pioneers in recognizing the social responsibilities of business in a democracy."

Mr. Gifford pointed out that he stressed what had been done by the Bell System, which "is by no means the entire industry." "I feel, however," he said, "that we are all part of the same family and what one member of the family does, the entire family is concerned with and if it is creditable may properly take pride in."

▼ ▼

California Companies Plan Consolidation

A Wardman, president of the Whittier (Calif.) Home Telephone & Telegraph Co. and the Downey (Calif.) Home Telephone & Telegraph Co., announced on September 7 that proceedings have been started for the reorganization and refinancing of the companies under the name of the Consolidated Telephone Co.

The ownership and management of the Consolidated Telephone Co. will remain the same as now exists in the Whittier and Downey companies.

The corporate name of the Whittier Home Telephone & Telegraph Co. has been changed to Consolidated Telephone Co. Application has been made to the California Railroad Commission for the taking over of the Downey company's property and assets by the Consolidated company. An application will also be made to the California Railroad Commission for authority to issue some $350,000 in bonds.

This is made necessary by the rapid growth in various districts served by the companies, by complications in rendering of extended telephone service and other contemplated changes.

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Drop Wire Construction Methods (Cont.)

The phrase *subscriber's drop* as used in the telephone field refers to the wiring between the open wire or cable distribution system and the subscriber's protective apparatus. The drop may consist of either insulated paired wire or two bare wires; modern practice, however, dictates the use of insulated wire.

Drop wire has the shortest life of any type of outside plant; unless properly installed it will cause excessive maintenance trouble. Failure to support drop wires properly at point of attachment to poles or buildings and the abrasive action of tree limbs are the two chief causes of short life and excessive maintenance.

Materials Required to Install Drop Wire

To properly install drop wire plant the lineman must be equipped with a variety of supporting devices to fit the different conditions encountered. The principal items needed are: Wire, insulators, support attachments and bolts and screws.

The insulated paired drop wire commonly used is the No. 17 and No. 18 gauges having bronze, Copperweld steel, or special iron (Ironite) conductors. The bronze conductor of No. 17 B & S Gauge has a tensile strength of 170 pounds per conductor and the No. 18 B & S gauge, 200 pounds per conductor. The twisted-pair wire weighs approximately 33 pounds per 1,000 feet.

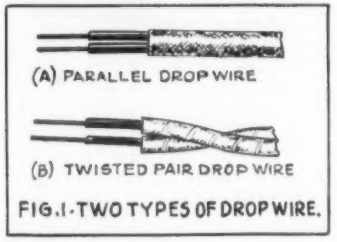

FIG. 1 - TWO TYPES OF DROP WIRE.

The Copperweld steel twisted-pair drop wire weighs 32 and 27 pounds per 1,000 feet, respectively, for the Nos. 17 and 18 AWG sizes. The breaking load per conductor for these sizes is 200 pounds and 170 pounds, respectively.

The twisted-pair Ironite drop wire in sizes Nos. 18 and 19 BWG weighs 39 pounds and 27 pounds, respectively, and the tensile strength is 170 pounds per conductor.

Formerly only twisted pair drop wire was available but in recent years parallel wire has become popular and is now used exclusively by most of the larger companies and many of the smaller companies.

The two types are illustrated in Fig. 1. To provide some protection against abrasive action where drop wires pass through trees, the larger companies make use of wire having a special wear-resisting braid.

FIG. 2. PORCELAIN KNOBS FOR USE WITH TWISTED PAIR DROP WIRE.

Another kind of wire needed in drop work is that known as bridle wire. Bridle wire consists of twisted pair solid copper conductors with a rubber and braid insulation. The two most popular sizes are No. 18 and No. 20 B & S gauge. The present trend is to use No. 20.

Bridle wire can be used wherever there is no mechanical load on the wire; for example, ring wiring on buildings, wiring from cable terminals to open wire, etc. It is somewhat smaller than regular drop wire and handles much easier. The average small

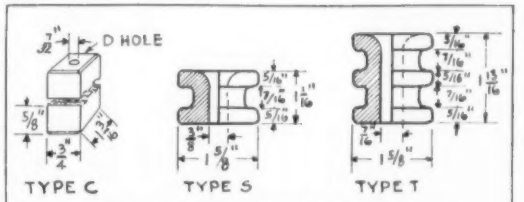

FIG. 3 - PORCELAIN KNOB FOR USE WITH PARALLEL DROP WIRE.

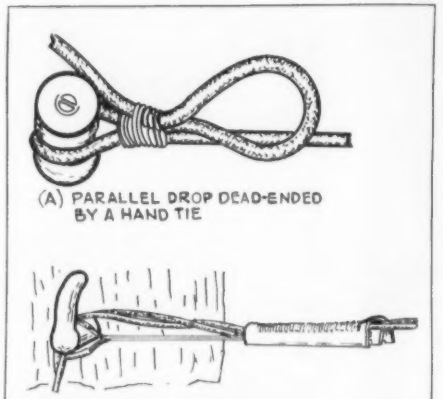

FIG. 4. TWO BASIC METHODS OF DEAD-ENDING DROP WIRE.

exchange uses only drop wire as there are, as a rule, few instances where bridle wire is needed.

Drop wires are supported on poles or buildings, either on porcelain knobs or by means of special metal clips and clamps.

There are six types of porcelain knobs in general use. Fig. 2 shows the two and four-groove knobs used with twisted pair drop wire.

In addition to these knobs there is also available a special self-tying knob (Fig 2-C). This knob is designed for use with twisted-pair drop wire. Fig. 3 illustrates the three types of knobs used with parallel wire.

There are two basic arrangements for attaching drop wires to poles or buildings. One method involves tying the drop to a porcelain insulator which is attached to the building or pole by some type of metal support or bracket. The other uses a special metal clip or clamp in conjunction with a metal hook to support the wire. The two methods are illustrated in Fig. 4. Various types of drop wire supports are shown in Fig. 5.

COMMISSION AND COURT ACTIVITIES

(Continued from page 22)

company in line with those of the Michigan Bell.

Existing rates of the Hillandale company for one, two and four-party line service are identical with the rates charged by the Michigan Bell for the same type of service, and will remain in effect.

Serving 280 subscribers in Benton, Bainbridge, Sodus, and Pipestone townships of Berien county, the Hillandale company operates in an area also covered by the Michigan Bell company's Benton Harbor exchange. The Hillandale company has no central office, its lines being connected with the Michigan Bell's Benton Harbor exchange, from which it purchases service.

The Michigan Bell now serves 4,700 telephones from its Benton Harbor exchange, including 350 on rural lines, all being afforded automatic dial service. Most of the Hillandale customers are served on a manual basis, but if the petition is approved the Michigan Bell proposes to improve the lines and to supply automatic dial service.

▼ ▼

Nebraska REA Project Builds Non-Standard Lines

The Nebraska State Railway Commission recently discovered that the Lancaster County Rural Public Power District, after having been authorized to construct lines according to standard specifications, had installed about 12 miles of extensions in which the single-wire system was used. This system calls for grounding by the use of three rods. All other construction has been two-wire, with a neutral line to carry the current when a break occurs. Upon discovery of its single-wire system the district asked for approval of what it had done.

This brought protests from engineers of the power companies and from H. H. Wheeler, Jr., chief engineer of the Lincoln Telephone & Telegraph Co. He said that the construction is dangerous and that where it is in use it has set up interference with the company's rural lines. The district's own engineer said that he preferred the two-wire type of construction, but did not believe the one made was any more dangerous. He said that the work had been done by the supervisor on his own initiative. The hearing was continued until other engineers could give testimony.

District representatives said that the single-wire type greatly reduced the cost of rural lines, and that its adoption would permit them to reach more farm homes. All of the districts are operating at a loss when interest, amortization and depreciation are calculated, because they have been unable to get the 2.4 customers to the mile that REA says is necessary for profitable operation.

By reducing the cost of pole line construction and by substituting a cheap transformer, costing approximately $21, which the REA has purchased in quantities, they expect to get the required number of customers. The new transformer has only about one-fifth of the capacity of the type used by private companies and until now by the districts, and this means that only limited service can be used.

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Summary of Commission Rulings and Hearings

Federal Communications Commission

September 15: Indiana Bell Telephone Co. filed application requesting authority to supplement existing facilities between Princeton and Mt. Carmel, Ind.

September 18: American Telephone & Telegraph Co. granted authority to supplement existing facilities between Kansas City and Joplin, Mo., and between Tulsa, Okla., and Dallas, Texas, by purchase from the Southwestern Bell Telephone Co.

September 18: Illinois Bell Telephone Co. granted authority to supplement existing facilities in the vicinity of Kankakee and Raymond, Ill.

September 22: Hearing on motion of Pacific Telephone & Telegraph Co. for extension of time in complaint of Washington State Department of Public Service against the company.

October 9: Hearing to bring about legal determination of the FCC's authority over telephone rates where exchange areas extend over state lines.

Alabama Public Service Commission

September 20: Hearing on petition of Southern Bell Telephone & Telegraph Co. for authority to install a new exchange plant and automatic dial system in Tuscaloosa.

Illinois Commerce Commission

September 26: Hearing in Chicago on proposed change in base rate area of the Blue Island exchange of the Illinois Bell Telephone Co.

September 26: Hearing on complaints of the village of Calumet Park and the Cedar Park Cemetery Association, Inc., against proposal of Illinois Bell Telephone Co. to change rates and cost of service.

September 27: Hearing in Chicago on application of Illinois Bell Telephone Co. for authority to file changes in its schedule of exchange rates applicable to its Lansing exchange, on less than 30 days' notice.

September 28: Hearing in Chicago on complaint of Alfred O'Connor, Chicago attorney, as to illegibility and small print in telephone directories fur-

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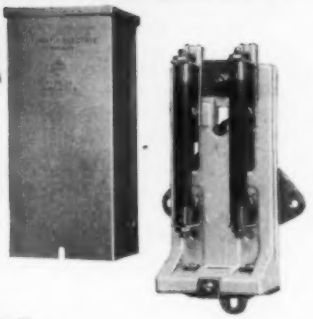

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nished in the city of Chicago by the Illinois Bell Telephone Co.

Indiana Public Service Commission

September 13: Hearing in Indianapolis on complaint of Fishers Telephone Co. against the Union Telephone Co. of Carmel. A number of witnesses were examined but a ruling is not expected until engineers of the commission have made a survey of the property and made their report.

The Fishers company claims that the Carmel company is installing telephones in its territory and asks the commission to establish a line defining the territory in which each may operate and suggests that White River be made the line. The Carmel company is contesting the petition.

Kansas Corporation Commission

October 10: Hearing on application of Western Light & Telephone Co. for authority to make certain changes in rates for service in Republic.

October 10: Hearing on Southwestern Bell Telephone Co.'s application for permission to file and put into effect a new schedule of rates in Blue Rapids.

October 12: Hearing on complaint of Clarence Rock against service furnished by Larkinburg Mutual Telephone Co.

October 12: Hearing on application of Bloom Telephone Exchange for permission to cease operating.

Kentucky Public Service Commission

September 13: Southern Bell Telephone & Telegraph Co. ordered to discontinue by June 30, 1940, its monthly charge of 15 cents for handsets.

The commission said the company had agreed to immediately remove the charge from a "substantial number" of its subscribers and that it would be "entirely eliminated" by next June.

The company's recent practice has been to collect 15 cents a month for 18 months on the handsets, compared to the monthly charge of 50 cents when they were first made available some years ago.

The commission estimated the company's revenue from the special charge had totaled approximately $25,000 in 1938.

Michigan Public Service Commission

September 13: Michigan Bell Telephone Co. authorized to enlarge Greenville exchange base rate area by approximately one square mile of urban territory.

September 13: Michigan Bell Telephone Co. authorized to reduce charges for combination private line services to a flat, monthly alternate use charge of $15.00 per teletypewriter station connected for alternate use.

September 15: Tri-County Telephone Co. authorized to charge the following rates at its Lawton and Marcellus exchanges: Within base rate area: business one-party, $3.25; business two-party, $2.50; business extension, 75 cents; residence one-party, $2.50; residence four-party, $2.00, and residence extension, 50 cents.

Outside base rate area: business or residence one, two or four-party, base rates plus mileage; business rural, $2.50; business extension, 75 cents; rural residence, $2.00. and residence extension, 50 cents.

Handsets in lieu of desk or wall instruments in connection with one, two or four-party service to be furnished at no additional charge.

Rates at Marcellus are to become effective upon next regular billing date. Rates at Lawton are contingent upon plant and service improvements including installation of automatic dial common battery service.

October 4: Hearing in Lansing on application of Tri-County Telephone Co. for authority to adjust rates in Clinton, Gobles, Hartford, Paw Paw and Schoolcraft.

Nebraska State Railway Commission

September 18: Hearing on application of the Lincoln Telephone & Telegraph Co. for authority to revise rates at its Julian exchange upon conversion from magneto to automatic dial operation. Petition was filed by subscribers consenting to increases, also one petition was filed objecting unless, in addition to free service to Nebraska City, free service be given both ways. Figures submitted by company show a loss of $585 during last year on $6,762 investment, while new rates will leave company still operating at a $370 loss. The case was taken under advisement.

September 22: Hearing on application of Nebraska Continental Telephone Co. for authority to discontinue its exchange at Loretto and provide service from Albion exchange. Objections were filed by subscribers because party service will be substituted for individual lines. The case was taken under advisement.

September 25: Hearing on applications of Milburn & Anselmo Telephone Co. for authority to acquire small properties belonging to Gus Jochem and Mrs. Sallie Wilkinson and for issuance and sale of notes in the amount of $3,500 to finance the transaction.

September 28: Hearing on application of Meadow Grove Telephone Co. for authority to establish a metallic rural rate of $1.75 a month. Case was taken under advisement.

Ohio Public Utilities Commission

September 20: Approval given to application of Viola Pekari, R. F. D. Quaker City, to purchase for $600 from Anna Pekari, administrator of the estate of Louis Hunt, an undivided one-half interest in the property of the Deal & Hunt Telephone Co., a partnership.

September 20: Star Telephone Co., of Ashland, authorized to revise rates for service in its Savannah exchange, as follows:

Business independent line, $1.75 to $2.50; business four-party, $1.50 to $2.25; business rural, $1.25 to $2.00; residence independent, $1.50 to $2.25; residence four-party, $1.25 to $2.00, and residence rural, $1.25 to $2.00.

The rates are to become effective on the inauguration of automatic dial service with free service to the Ashland exchange.

September 21: Northern Ohio Telephone Co. given authority to file a new schedule of rates for its Attica

HEMINGRAY Glass INSULATORS

For a long life of dependable low-cost service rely on Hemingray Pin-Type Glass insulators.

No aging or deterioration . . . unaffected by sudden temperature changes . . . interval strains and stresses removed . . . homogeneous in character, only one coefficient of expansion . . . sustained high dielectric strength . . . clear, flawless for easy inspection . . . all surfaces impervious to moisture . . . tougher, improved glass to withstand rough handling. Write us about your requirements. We'll gladly send samples.

Owens-Illinois Glass Company, Muncie, Indiana.

Export Agents: International Standard Electric Corp., New York

exchange with unused rates for switching service eliminated.

September 21: Ohio Bell Telephone Co. given authority to file new boundaries for its Lisbon and East Liverpool exchanges, to provide for the transfer of some territory from the former to the latter.

Authority was also granted for a similar transfer for the exchanges of Louisville and Alliance.

Oklahoma Corporation Commission

September 20: Application heard and taken under advisement involving request of the Southwest Telephone Co., for installation of new common battery automatic dial service in Davidson.

The company said that for the year ended December 31, 1938, total operating revenues of the Davidson exchange amounted to only $2,258.90, with total operating expenses of $2,898.12, leaving a net deficit of $639.22, before depreciation, interest, etc.

The applicant asks for the following readjustment of rates: Business one-party, increase from $2.50 to $3.25; business two-party, proposed rate, $2.50; residence one-party, $1.50 to $2.25; residence two-party, proposed rate, $1.75; residence four-party, proposed rate, $1.50; business extension, $1.00, no increase; residence extension, 50 cents, no increase; deskset, extra charge, 25 cents, no increase, and handset, extra charge, 15 cents, no increase.

September 26: Hearing on application of Frank Crawford, owner Sulphur Telephone Co., for increases of 50 cents per month on individual and party business telephone service.

October 19: Hearing on rates of the Southwestern Bell Telephone Co., in 144 of its exchanges. This is a statewide hearing of telephone rates of the company following an appraisal and survey of property of the company conducted by the corporation commission for the past two years.

Pennsylvania Public Utility Commission

September 15: Approval given to a plan of the Bell Telephone Co. of Pennsylvania for a new type of service which will reduce toll charges on Philadelphia calls made in certain suburban areas.

The plan provides for an increase in the base charge for unlimited service and also increases the number of exchanges that may be called. It will be put into effect at once for subscribers who desire it.

The commission approved a similar service for the Pittsburgh area and also allowed the company to revise its rate schedule for "foreign" exchange service under which subscribers in one exchange area receive service from another exchange.

The commission estimated the changes will reduce the company's revenue about $78,000 annually.

Wisconsin Public Service Commission

September 27: Hearing in Madison on commission's investigation of rates charged by Wisconsin Telephone Co. to "Community Chests" organizations.

September 28: Hearing in Madison on application of Commonwealth Telephone Co. for authority to sell and abandon certain lines located in the towns of Highland in Iowa county and Castle Rock and Muscoda in Grant county.

September 28: Hearing in Madison on application of Philip P. McGuire and Joseph T. Novak for authority to transact business as a public utility furnishing telephone service in the towns of Castle Rock, Grant county, and Highland, Iowa county.

October 2: Hearing in Madison on application for consent and approval of sale of 6.4 miles of rural telephone line by the Elroy Telephone Co. to the Lemonweir Valley Telephone Co. Sale price of the line will be $200.

▼ ▼

Associations Use Maps to Show Exchange Locations

Several of the state association secretaries have adopted the idea suggested by the United States Independent Telephone Association's map of the United States upon which are indicated the locations of the Independent telephone exchanges. This map, distributed about a year, was based upon data from TELEPHONY'S Directory of the Telephone Industry.

B. H. Piepmeier, secretary-treasurer of the Tennessee Independent Telephone Association, Cookeville, in addition to making up a map of Tennessee with the Independent exchanges on it, took note of the shape of the state. It is such as to fit nicely on the bottom of the association's letterheads and Mr. Piepmeier has added it to the association's stationery.

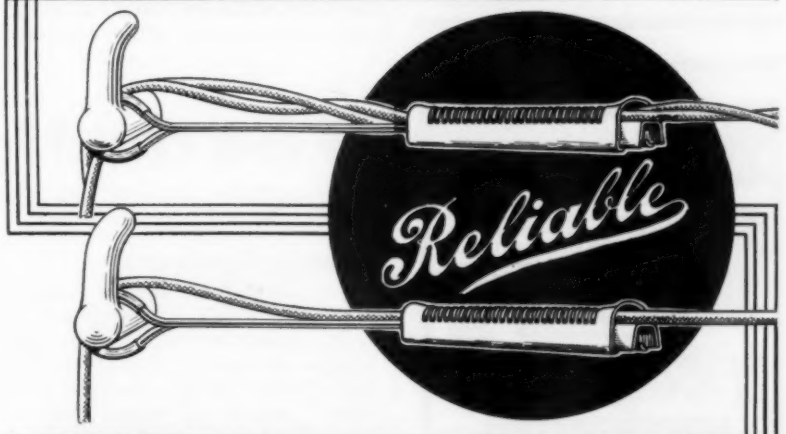
George B. Butler, secretary of the Texas Telephone Association, Austin, indicates on the Texas map the location of every telephone exchange in the state and also designates county seat exchanges. Different symbols distinguish between Independent and Bell exchanges.

Frank L. McKinney, secretary-treasurer of the Ohio Independent Telephone Association, Columbus, last fall made up an Ohio map showing the locations of Independent exchanges.

The late H. E. Bradley, president of the Pennsylvania State Telephone & Traffic Association for many years, also used a map idea a few years before his death. On his map he showed the operating territories of Independent and Bell companies in shaded areas.

These state maps have been used effectively in many ways for the benefit of the industry. They show at a glance the many exchanges in each state and members of state legislatures have found them of great value when considering proposed measures affecting telephone companies.

"STANDARDIZE DEAD-END TIES"



DROP WIRE CLAMPS

- The type "P" drop wire clamp is
- an ideal device for attaching
- No. 17 B&S twisted pair or
- parallel drop wire to poles and
- buildings. It prolongs the life of
- the drop wire, permits free
- swinging at the tie, places all
- of the wear on the hardware
- and eliminates the sharp bends
- necessary with other methods.

This clamp is easily and quickly installed, making a very neat installation. Slack in drop wires can be taken up quickly without leaving any weak spots on the wire. Write for samples.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

TRANSMISSION TESTS MADE EASY

The Shallcross No. 690 Transtester (Decibel Meter) and No. 691 Tone Generator (1000 Cycle Oscillator) were developed to provide a convenient yet inexpensive method of measuring transmission losses in lines, switchboard circuits, apparatus and other equipment.

No. 690 No. 691

This testing equipment gives the wire chief a convenient method for making tests of the switchboard and main frame, testing cord circuits, picking up cable pairs and checking subscriber's lines.

Write for Bulletin No. 690CE

SHALLCROSS MFG. COMPANY
COLLINGDALE, PENNA.

New Western Advertising Manager for "Telephony"

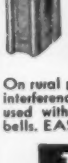
ALBERT J. STULTS has joined TELEPHONY'S advertising staff and becomes Western Manager, succeeding D. C. Sorensen, who has been associated with TELEPHONY since December, 1925. The friendship developed during the nearly 14 years of relationship with Mr. Sorensen will continue for he is not entirely severing his connection with TELEPHONY.

Mr. Stults—"A. J." as he is known to his friends—brings to TELEPHONY many years of valuable sales training and experience. He was a divisional sales manager of the Fuller Brush Co. with more than 40 salesmen to supervise. More recently he has been identified with the real estate business in a sales and managerial capacity. His position as secretary of the E. E. Stults Realty Co., Chicago, furnished excellent experience and he is well qualified for his new duties in TELEPHONY'S organization.

In his new work as editor of The Barrington (Ill.) Review, a weekly community newspaper, we feel confident Mr. Sorensen will meet with success, and our best wishes are cordially extended. He has shown exceptional ability while associated with TELEPHONY. In the 14 years of service to TELEPHONY advertisers, he has made many warm friends and they join TELEPHONY'S staff in extending him their best wishes in his new work.

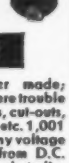
A. J. STULTS, new western advertising manager of TELEPHONY, has an excellent background of varied sales experience.

IMPROVED
RARE GAS ARRESTERS



Avoid interruptions to service and provide full protection. Keep your lines clear and reduce maintenance expense. Interchangeable with other types.

New Vincent
RARE GAS RELAYS



On rural party lines cuts out inductive interference, improves transmission; used with either coded or harmonic bells. EASY to install.

TEST-O-LITE

Handiest electrical tester made; Neon light quickly tells where trouble lies in electric circuits, fuses, cut-outs, motors, radios, appliances, etc. 1,001 uses for electricians. Tests any voltage 110 to 550; tells A.C. from D.C. Fountain-pen size; with pocket clip. Lifetime guarantee.

L. S. BRACH Mfg. Corp.
NEWARK, N. J. - Estab. 1906
Oldest Makers of Rare Gas Devices

With the Manufacturers

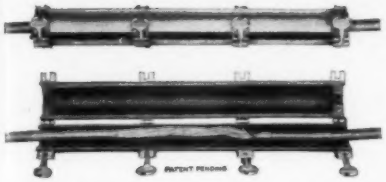
Invention Speeds and Simplifies Cable Repairs

When a telephone cable fault or break occurs, the universally-accepted temporary repair has been the application of muslin, paraffin, tape and spiral rubber bandage in varying amounts. Through use of the new Cavanagh cable repair sleeve, such troubles may be easily and quickly repaired with considerably less labor and distinct savings in time and materials, it is claimed.

The Cavanagh cable repair sleeve is made of 16 gauge, cold-rolled steel, which is cadmium plated. It is tubular in shape, 18 inches long and is made in eight sizes to accommodate cables containing 15 to 300 pairs. At each end of the metal cylinder are thick specially-molded rubber plugs which are securely anchored so as to prevent both collapse and blow-out due to different pressures caused by varying temperatures.

The cylinder is hinged on one side and directly opposite the hinges are four locking members. Around the opening edges are molded strips of specially-treated rubber, in the form of gaskets. The inside of the cylinder is treated with a special rubber insulating compound; when the unit is clamped around a piece of defective cable and the four locking members are tightened, the section of the cable enclosed is thus protected by a complete seal. The manufacturer states that laboratory tests at temperatures from —30 degrees to 212 degrees Fahr. show no condensation and that pressure tests prove the sleeve absolutely free from leakage.

The use of the Cavanagh cable re-



New Cavanagh cable repair sleeve intended for speedy repair work.

pair sleeve is said to be simple. First the proper size sleeve is selected to accommodate the cable. The sleeve is opened and a small amount of oily substance is placed in the groove of the end rubber plugs. This prevents pulling at the point of contact between the plug and the cable covering.

With the lower section in position, the upper half is swung over and closed and is quickly fastened by means of the four locking members. The fracture has then been completely sealed and the cable may be left in complete safety until permanent repair can be made.

The cable repair sleeve may be used on aerial, underground and buried cables. While its principal use is in the form of temporary enclosures, the manufacturer recommends its adoption as an insulating joint between aerial and underground systems.

This new invention has been developed over a period of years by Horace Cavanagh, engaged in the telephone industry for more than a quarter of a century. It is distributed by W. J. Shay, 1414 S. Michigan Ave., Chicago, Ill.

▼ ▼

Process of Molten-Welding Copper to Steel Described

Just off the press is an eight-page booklet completely illustrated in color describing the unique process of molten-welding copper to steel in the manufacture of Copperweld.

The booklet describes the rolling, drawing, and stranding of Copperweld wire and strand, and also depicts the manufacture of Copperweld ground rods.

A copy of this interesting booklet may be obtained by writing to the advertising department of Copperweld Steel Co., Glassport, Pa.

▼ ▼

Transmitter on Stromberg-Carlson Magneto Telephones

All Stromberg-Carlson desk-stand and wall magneto telephones are now being manufactured with a Stromberg-Carlson No. 20 type transmitter, it is announced by L. L. Spencer, Stromberg-Carlson sales manager.

This improved transmitter gives the user of desk-stand and wall telephones a highly-efficient transmitter like those used in the popular new Stromberg-Carlson handset telephones. For magneto use with two dry cells, the No. 20 type transmitter offers transmission superior to the older types it replaces. It is efficient under low-current conditions encountered on long lines and will stand up under heavy current conditions present on short lines. It eliminates the necessity of zoning transmitters.

The front and mouthpiece of the No. 20 transmitter are one unit of molded, black phenol compound, in a permanent finish, and so designed that breakage from being struck or knocked against something accidentally, is almost impossible. A cone-shaped, corrugated, duraluminum diaphragm is employed which operates with a piston-like motion, giving uniform conveyance of words spoken into it.

A universal transmitter, the Stromberg-Carlson No. 20 type is said to work equally well on long or short magneto or central energy lines.

The No. 20 type transmitter may be installed without change in any Stromberg-Carlson transmitter back, or with an adapter in practically any wall or desk set, regardless of make. It is furnished as a complete transmitter with back or as mouthpiece and transmission unit for replacing transmitters now installed and in use.

▼ ▼

Consulting Engineer's Office Opened By E. D. Talbot

After spending several months in Brazil, South America, inspecting tele-

View of new booklet, "Copper Molten-Welded to Steel Makes Copperweld."

Crapo
HIGH-TENSILE
LOW-RESISTANCE
TELEPHONE WIRE

LONGER spans, with marked savings in costs, on new construction.... STRONGER spans, with lower maintenance expense, on existing lines . . . Better transmission . . Improved service . . More profitable operation.

These and other outstanding advantages accrue from use of the new Crapo HTL-85 and Crapo HTL-135 High-tensile, Low-resistance Telephone Wires on rural lines.

Crapo HTL-85 permits spans up to 225 feet in heavy, 325 feet in medium and 375 feet in light loading districts; provides stronger spans, at no increase in cost, on existing pole structures.

Crapo HTL-135, with two and one-half times the tensile strength of the B.B. grade, provides for spans of 350 feet in heavy loading districts to 500 feet in light loading districts. Both Crapo HTL-85 and Crapo HTL-135 possess telephone transmission qualities superior to standard B.B.

Complete technical data and construction practice information about Crapo HTL-85 and Crapo HTL-135 High-tensile Line Wires are available in booklet form. Write for Bulletins No. 201 and No. 202!

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA
Manufacturers of
Crapo Galvanized Steel Strand, Telephone and Telegraph Wire, Construction Wire, Tie Wire

Classified Section

Rates 10 cents per word payable in advance.
Minimum charge $2.00 for 20 words or less.

New Style Stewart Test Sets

Have detector coil for telling direction and lamp for telling distance to trouble. Sent on trial. Price

$36.00

STEWART BROS.
Ottawa, Ill.

POSITIONS WANTED

POSITION WANTED: Man, 33 years old, wants work. Capable managing rural exchange. Nine years' experience in rural maintenance and operating. Wife experienced operator. References. Available now. Address 8852, care of TELEPHONY.

WANTED: Position selling telephone supplies and line hardware, in the Southwest. Commission basis. Address 8853, care of TELEPHONY.

POSITION WANTED: Telephone operator or manager in charge. Twelve years' experience, executive ability. Widow. Excellent references furnished. Address 8854, care of TELEPHONY.

POSITION WANTED: Twenty years' experience Plant and Central Office maintenance, manual and automatic. Willing to start at reasonable salary in any locality. Address 8791, care of TELEPHONY.

MANSBRIDGE TYPE CONDENSERS

For telephone, telegraph and radio service. Superior to tin foil type as they are non-short-circuiting and occupy smaller space in installations.

Write for list of stock sizes. We also make special condensers to specifications furnished us.

Special terminal design on metal case to exclude air and moisture.

THE ELECTRIC SPECIALTY CO.
CRESCO, IOWA.

TELEPHONY ADVERTISERS

• will give you service which will be pleasing •

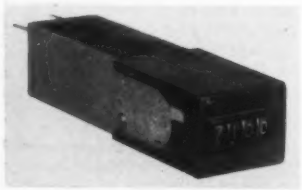
FOR SALE

FOR SALE: 50 No. 23-D Gray Pay Stations with Western receivers and transmitters @ $15.00 each. Guaranteed. Address E. R. Corwin, 642 E. 31st St., Indianapolis, Ind.

FOR SALE: 30 Kellogg wall telephones, $3.00; 50 Cook protectors, No. B-7; 15 Kellogg stands and ringer boxes. Address 8851, care of TELEPHONY.

RECONDITIONED

REGISTER METERS



These can be furnished

INDIVIDUALLY

STRIPS OF TEN

STRIPS OF TWENTY

Write for prices

BUCKEYE TELEPHONE and SUPPLY COMPANY

COLUMBUS, OHIO

phone systems serving the cities of Bahia, Recife, Victoria, Natal and Mareio, Emmett D. Talbot has returned and established a consulting engineering office at 129 Milford Drive East, Syracuse, N. Y. Having been associated with telephone operating companies for more than 30 years, Mr. Talbot is well known to many telephone executives.

During his career in the industry, Mr. Talbot has served in many capacities ranging from general plant superintendent to consulting telephone engineer. His work in the United States and in foreign fields has placed him in close contact with problems of operating companies.

EMMETT D. TALBOT, recently returned from inspecting telephone systems in South America, has established a consulting engineering office in Syracuse, N. Y. His work in the United States has included varying positions in the telephone industry.

Michigan Bell Issues Police Telephone Directory

To aid federal, state, county and municipal law enforcement officers in their war on crime in the state, the Michigan Bell Telephone Co. has issued the sixth edition of its police telephone and teletype directory.

Copies have been supplied to authorities throughout Michigan and to newspapers for the use of their editorial staffs in getting into quick touch with police authorities.

Listed in the directory are the names and telephone numbers of the chiefs or heads of all municipal police departments; sheriffs of the 83 counties; commanding officers at all of the 39 state police posts, and the several federal law enforcement bureaus or branches in Michigan.

MATHEMATICS FOR TELEPHONE ENGINEERS

(Continued from page 13)

Now if C/2 is subtracted from column A, table I, then we have column D of Table II.

TABLE II

A	B=C/2	D=(A-C/2)
1.56	0.215	1.345
3.75	0.42	3.33
4.0	0.0	4.00
2.91	—0.42	3.33
1.13	—0.215	1.345

The arithmetical sum of D is 13.35; and dividing this by 5 gives 2.67 as the mean ordinate; therefore,

$$A_1 = 2.67 \times \pi/2 = 4.2.$$

The component curves of Fig. 237 all pass through zero when $\Theta = 0$. It will sometimes happen that these curves have an initial ordinate when $\Theta = 0$. This will not affect the process for resolving a curve into its components but these components are now of the form $A_n \sin (\Theta + \varnothing)$ and it is necessary to be able to determine the value of $\varnothing$.

Such a curve is represented in Fig. 238 where a sine curve has an initial value of 2 and a maximum ordinate A, which is 4. If we express these two ordinates in terms of unity, then A = 1 and the initial ordinate = (2/4) = 0.5. 0.5 is the sine of $\varnothing$ and from tables $\varnothing$ is seen to be 30 degrees.

For any curve with an initial ordinate y at $\Theta = 0$, the angle $\varnothing$ is simply obtained by the ratio (initial/maximum) ordinates when the result is the sine of the angle by which the curve leads on the angle 0 degrees.

(To be concluded)

▼ ▼

More Radios Than Telephones in Canada

There are more radio sets than telephones in the homes of Canadian families in the low income group, a survey by the Dominion of Canada Bureau of Statistics reveals.

Appreciable differences were noted among wage-earner families in relation to the amount of household facilities and equipment at their disposal. Of the families of British origin, who owned homes, 86 per cent also possessed radios; of the same families only 49 per cent had telephones.

Among tenants, 82 per cent had radios, and 36 per cent telephones. Tenant households, however, appeared more completely equipped with general plumbing facilities such as kitchen sinks, bathtubs, inside running water, etc. Practically all dwellings of both owners and tenants were lighted by electricity.

As income levels advanced, there was an appreciable rise in general living conditions and a greater proportion of expenditure was devoted to non-necessities. Household facilities and equipment were far more complete among families at high income levels. The greatest variations in this field occurred in relation to such items as motor cars, refrigerators and telephones.

Obituaries

WALTER G. LUSCOMBE of Wilmette, Ill., who retired as assistant treasurer of the Illinois Bell Telephone Co., Chicago, in 1930 after nearly 50 years with the firm, died September 13. He was 77 years old.

Mr. Luscombe began his career as a boy operator, was division commercial superintendent for many years, and then was made assistant treasurer. His wife, Martha Suplee Luscombe, died last June 22. A daughter, Mrs. Carolyn E. Church, survives.

▼

THOMAS J. KING of Yonkers, N. Y., sales manager of the toll and teletypewriter division of the New York Telephone Co., died September 12, at the age of 40 in the Yonkers General Hospital. He was stricken with a streptococcus infection three months ago.

Mr. King, a native of Ashland, Mass., was graduated from Holy Cross College in 1921. He held the New England half-mile championship when he was captain of the college relay team.

Sixteen years ago Mr. King was employed by the Bell Telephone Co. of Pennsylvania, transferring in 1926 to New York. There he was commercial manager of several East Side branches until in 1930 when he became division sales manager. Since then he had filled various sales executive assignments.

Surviving are his widow, Ellen; two sons, Thomas Jr. and William; a daughter, Elaine; and a brother, Edward.

CABLE LUBRICANTS

Albany Underground Cable Lubricant adopted by **Bell System** for pulling lead sheathed cable. Write for particulars. Adam Cook's Sons., Inc., Linden, N. J.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated. Quotations on request.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finishd Cedar Poles. Plain or butt-treated.

Western Red Cedar Company, P. O. Box 663, Sandpoint, Idaho.—Plain or butt treated Western Red Cedar poles.

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"Modernization of Equipment and Methods for Improved Service"
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ONLY ONE CONTACT!

PRICE $44.00 EACH
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Use of Vacuum Tubes in Telephone Work Is Increasing. Learn About Them From

FUNDAMENTAL ELECTRONICS AND VACUUM TUBES

By ARTHUR L. ALBERT

Professor of Communication Engineering, Oregon State College

Discusses the principles of electronics and the theory of vacuum tubes, photocells and copper-oxide varistors in radio and in telephone circuits. Stresses both the theory of these devices and the design and operation of circuits in which they are used. The book is non-mathematical and of practical value to those in engineering and operating branches of telephony.

422 Pages — 6 by 9 in. — $4.50

TELEPHONY PUBLISHING CORPORATION

608 S. Dearborn St., Chicago
WABash 8604

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International Harvester Co. ... —
International Resistance Co. .. —
Joslyn Mfg. & Supply Co. ..... —
Kearney Corp., James R. ..... —
Kellogg Switchboard & Supply Co. 4-5
Kennecott Wire & Cable Co. (subsidiary of Kennecott Copper Corp.) ..... —
Kester Solder Corp. ..... —
Klein & Sons, Mathias ..... —
Leich Sales Corporation ..... —
Lenz Electric Mfg. Co. ..... —
Loomis Advertising Co. ..... —
Lorain Products Corporation. —
MacGillis & Gibbs Co. 33
Mastergrip Utilities Supply Corp. ..... —
Matthews Corp., W. N. ..... —
Michigan Pole & Tie Co. 1
National Carbon Co., Inc. ..... —
National Construction & Engineering Co. ..... —
National Telephone Supply Co. 1
North Electric Mfg. Co., The. 36
Oliver Iron & Steel Corp. ..... —
Owens-Illinois Glass Co., Hemingray Division 28
Paine Company ..... —
Paragon Electric Co. ..... —
Partridge Lumber Co. 33
Philco (Battery Division) ..... —
Phillips Electric Works, Inc. . —
Porcelain Products, Inc. ..... —
Premax Sales Division, Chisholm Ryder Co., Inc. ..... —
Raytheon Mfg. Co. ..... —
Ray-O-Vac Company ..... —
Reliable Electric Co. 29
Rebuilt Electric Equipment Co. ..... —
Roebling's Sons Co., John A. . —
Schauer Machine Co. ..... —
Shallcross Mfg. Co. 30
Seymour Smith & Sons, Inc. ... —
Siemens Bros. & Co., Ltd. .... —
Sloan & Cook 33
Stewart Brothers 32
Stromberg-Carlson Telephone Mfg. Co. 3
Sturgis Posture Chair Co. 1
Suttle Equipment Co. ..... —
Telephone Repair Co. ..... —
Telkor, Inc. 34
Union Carbide & Carbon Corp. ..... —
Unique Mfg. Co., Inc. ..... —
United States Independent Telephone Association 6
United States Steel Corp. ..... —
Utica Drop Forge & Tool Corp. 33
Valentine Clark Corporation. 33
Veeder-Root, Inc. ..... —
Wagner Malleable Products Co. ..... —
Wall Mfg. Supply Co., P. ..... —
Western Electric Co. ..... —
Western Red Cedar Co. 33
Weston Electric Instrument Corp. ..... —
Wood Preserving Corp., The, a Koppers subsidiary 35
Wopat, J. W. 33
Wray & Co., J. G. 1

PRE-CONVENTION ISSUE

Telephony

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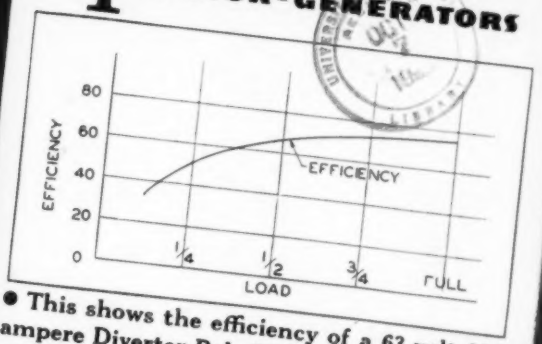
DAVEY TREE SERVICE

DIVERTER POLE MOTOR-GENERATORS



● This shows the efficiency of a 63 volt 100 ampere Diverter Pole Motor-Generator. Coupled with the fact that this set does not generate any more current than is actually required, these high efficiencies result in surprising savings in power bills.

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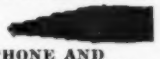

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PRE-CONVENTION ISSUE

4 WAYS TO SAVE MAINTENANCE AND REPLACEMENT COSTS WITH COPPERWELD

LINE WIRE

Save maintenance and replacement costs with Copperweld line wire—guaranteed to have the rust-resisting life of solid copper. The thick copper exterior also provides permanent low-resistance joints and connections. Copperweld gives you high strength with light weight and small diameter plus high conductivity and better voice transmission.

DROP WIRE

Save maintenance and replacement costs with Copperweld drop wire — the strongest drop wire made. Each No. 17 AWG wire has a guaranteed breaking strength of 200 pounds. The backbone of steel prevents stretching and enables Copperweld to stay up under heavy ice and wind loadings.

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Copperweld guy and messenger strand and cable rings cut replacement and maintenance costs because they are guaranteed to have the rust-resisting life of copper. Serving, bending, or clamping will not harm Copperweld strand—the thick ductile copper layer will not crack, flake, or peel.

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Dependability & Safety

Save maintenance and replacement costs with non-rusting, easy driving Copperweld ground rods and clamps. When a copper ground lead is joined to the heavy copper exterior of a Copperweld ground rod there is no electrolytic corrosion because there are no dissimilar metals in contact.

COPPERWELD

NON-RUSTING TELEPHONE PRODUCTS

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You are invited to drop in and see the Copperweld Exhibit at Room 2510, National Independent Telephone Association Convention—at the Stevens Hotel, October 10-13, 1939

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IMPORTANT MATTERS

Confront National Convention

A WEEK CRAMMED with addresses and discussions important to every company and Independent organization is planned for the annual convention of the Independent telephone industry. The usual convention joviality and friendliness will temper the seriousness of things to be covered next week. New developments to be exhibited

NEXT WEEK the Stevens Hotel, Chicago, will be crowded with enthusiastic Independent telephone people from all parts of the country. The attraction, of course, is the annual convention of the United States Independent Telephone Association and also the yearly gathering of the Independent Pioneer Telephone Association. Serious discussions and reminiscences will be interspersed with festive social activities and general good fellowship.

So many feature matters will be discussed that it is impossible to name any one the most important. As customary, the general session of the first day will be given over to statements and reports of the association's officers. And that they will be particularly interesting this year goes without saying because of the many activities and developments during the year, and also the general prevailing uncertainties of the future.

State association secretaries and presidents at their annual dinner on Tuesday evening, October 10, will discuss general cooperation for making the association still more effective.

The general session on Wednesday afternoon, October 11, brings up several matters that are of particular importance to everyone. "Employe-Employer Relations" are being given more and more consideration by both employes and companies. Hence the discussion of this subject by Robert M. Bruce, vice-president of the Rochester (N. Y.) Telephone Corp., is especially timely.

Committee reports on toll compensation, fire insurance, convention of the National Association of Railroad and Utilities Commissioners and the wage-hour problem will be packed full of interest and information. And questions concerning these matters undoubtedly will develop angles that may warrant further exploration by the committees.

The convention session Thursday afternoon, October 12, will be devoted to discussions of general conditions. "A Mountaineer's Viewpoint" by Congressman Albert A. Gore of Tennessee will deal with questions confronting our national legislators. Dr. David Friday, economist of Washington, D. C., whose addresses at previous national conventions have always been closely followed by large audiences will present the latest aspects of our national economic situation.

At the concluding general session Friday morning, there will be a review of present problems which will include the Social Security Act and REA developments. Opportunity will be given for various questions in the open forum which will follow this review.

The division conferences on Thursday morning will provide much detailed information concerning late developments and practices in the various classes of telephone work. Interesting programs have been prepared for the accounting, commercial, plant and traffic divisions by their respective chairmen: C. D. D'Aoust of Madison, Wis.; Sam H. Shutt of Sherman, Texas; E. W. Olschner of Tarboro, N. C., and R. S. Brewster of Lincoln, Neb.

Following the presentation of scheduled discussions in each of the conferences, opportunity will be given for discussion and for presentation of individual problems. Undoubtedly attendance at the conferences this year will reach record proportions.

The annual meeting of the Independent Pioneer association will be held Wednesday morning. The session will be opened by President J. C. Crowley, Jr., St. Paul, Minn., who will preside. His address will be followed with the presentation of reports by Secretary-Treasurer J. K. Johnston and chairmen of various committees. Following these, a humorous and philosophical address will be made by "Dusty" Miller of Wilmington, Ohio.

As the entire morning is being given over to the Independent Pioneers there will be ample opportunity for remarks by any of the Pioneers. It is anticipated that the attendance will be larger than in previous years due to greater interest and more time for the meeting.

The annual banquet, entertainment and dance of the Pioneers will take place Thursday evening, providing a climax to the convention activities. A new plan relating to tickets is being inaugurated this year whereby convention attendants will be required to register. Upon registration a complimentary ticket to the banquet is supplied. This is the only way in which banquet tickets can be secured. The evening's entertainment is being underwritten by manufacturers, suppliers and others.

The committee in charge is the same as in other years, with G. W. Rodormer as chairman, John F. Jaap, secretary-treasurer. It promises an outstanding entertainment. A well-known orchestra will furnish music during the banquet and for dancing afterward. Everything is prepared for a complete evening of gaiety.

The complimentary luncheon to visiting ladies is an established feature of the national convention. Since it was inaugurated two years ago the attendance has greatly increased and many friendships have been formed between visiting ladies from various states.

In order that all may be advised of the luncheon, the ladies are re-

(Please turn to page 44)